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THE ELECTROENCEPHALOGRAM AND DISORDERS OF BEHAVIOR

A Review[1]

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Introduction

In a previous paper, the status of the electroencephalogram (EEG) in relation to psychological disorders was reviewed (63). Since that date a much larger number of articles on the subject have appeared, and great advances in related information have been made. For this reason the present review, covering the years 1950–1955, has been compiled. It is intended to demonstrate the present state of knowledge concerning the relation of EEG patterns to behavioral patterns and to personality structure. It should also indicate the great change in our knowledge of the uses and values of the EEG during this five-year period.

Because of the large number of publications, only the most pertinent have been cited. The information dealing with animal experimentation, much of which is important to the subject, has been nearly all left out. No references have been made to articles published previous to the year 1950 although information gathered before that date is summarized where necessary.

In the previous article (63) the suggestions were, from data then available: 1) that the EEG's of subjects with psychological disorders were often of a different quality from those of normal individuals; 2) that the abnormality seen in the psychologically disturbed was related directly to the psychological disturbance and not to any other focal organic neurological disorder; 3) that instability of personality was related to instability of EEG pattern; and, 4) that heredity played a part in EEG patterning.

At the time of publication, however, all these points were controversial, and there was conflicting evidence on many details. Clinical diagnostic categories as well as EEG interpretations were often vaguely described, and there remained few points which could be used objectively for either qualitative or quantitative comparison of data.

During the five more recent years it will be seen: 1) that much has been done to eliminate the ambiguities described above; 2) that progress in the understanding of functional processes related to the brain has been enormous in many fields; and 3) that the EEG has materially contributed to such progress.

Significant factors in the electroencephalogram

Since the readers of this journal are probably not all acquainted with the interpretation of the EEG and since the remainder of this article deals largely with criteria by which EEG characteristics are recognized, a brief account of factors concerned with EEG interpretation follows.

An EEG is a rhythmic pattern of electrical activity recorded from the surface of the scalp. *Rate* of wave-form, *amplitude* or height of wave-form, and relative stability or instability of pattern are all that can be observed by the naked eye. Empirical values for normal and abnormal are known and are the result of complex variations in the above.

The normal EEG pattern varies with age, with waking and sleeping states, with temporary tension or relaxation. It can be altered by physical means such as tumors, cortical scars, disease or trauma.

The normal, most commonly seen wave-form is the alpha activity at 8–12 per second. Delta activity at 1–3 per second is abnormal in the

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adult. Theta activity at 4–7 per second appears in small amounts in the young adult or adolescent but is abnormal otherwise in the waking state. Beta activity, above 12 per second, has various subdivisions. That of 13–15 per second often appears in association with theta activity. Those rates above 16 per second, if they are of high amplitude and marked incidence, are abnormal. The degree of sensitivity or reactivity of the EEG pattern to various environmental stimuli is also considered, there being a degree of over-reactivity which is considered abnormal and which, in its extreme, leads to paroxysmal, episodic activity. About 5 per cent of the EEG's of young "normal" adults are reported as abnormal. Incidence of abnormality increases to 10–15 per cent below the age of about 16, and above about 50.

Advances in theoretical background knowledge

During the past five years there has been a change in the concepts of cerebral function which has affected clinical, physiological and psychological thinking. The structural has been related to the functional as never before by the most expert and wide-thinking specialists. There has been much effort by members of one discipline to understand and utilize the knowledge of another. The many conferences on the mind-brain interfunction are indicative of this.

An electrophysiologist, Eccles (27), in a discussion of the neurophysiological basis of mind, has attempted to construct a simplified organizational pattern which can account for the "spontaneous potentials" of the brain and for their "multiple potentialities of pattern". He has deduced from the known properties of neuronal excitability that the most probable rhythm of neuronal discharge at low background levels is that of about 10 per second. "Since the cerebral activity is recorded from the immensely complicated neuronal network —relatively high voltage waves would be expected only when large numbers of neurones are activated in phase, as is assumed from the alpha rhythm, while intense and finely patterned activity would give action potentials of negligible, small amplitude." Eccles thus explains the fact that the alpha activity at 8–12 per second, which is the most obvious waveform in the resting EEG, is present only when the brain is relatively quiescent, just before sleep, or when attention is not focused, while attention, tension or the addition of any sort of environmental stimulus such as light or sound will either diminish or abolish this slower complex, replacing it by faster potentials of lower volume.

The findings of the meeting of the Association for Research in Nervous and Mental Diseases published in 1952 (Vol. 30), on *Patterns of Organization in the Central Nervous System*, contain many discussions of cortical function as related to human behavior. The material presented by Weiss (136) on the factors affecting central and peripheral coordination in the amphibian is applicable to the function of the more complex nervous system, for in the amphibian there is an exact relationship always present between a peripheral structure and its cerebral functional segment. This relationship is inherent and constitutional in that it may be reestablished after interruption. Its specific functional relationship is always maintained.

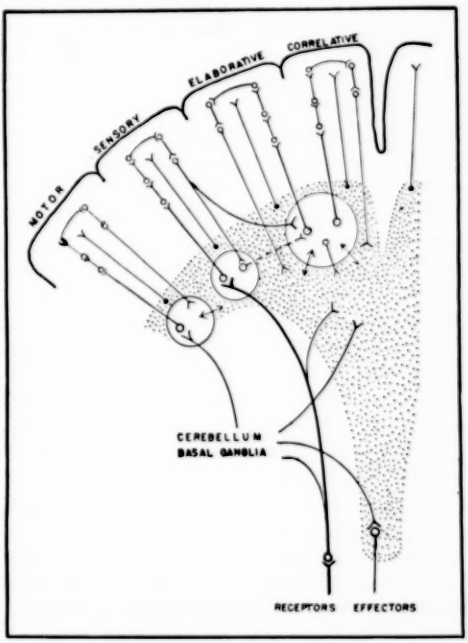
Amassian (2), in the same conference, describes the interrelationship of the autonomic system with the cerebral cortex. Using single stimuli and single unit cortical discharges which are simple, exact and reproducible as compared to the multiple "spontaneous" discharges of the EEG, Amassian has shown the effect on the single cortical unit of stimulation of both somatic and autonomic pathways and has demonstrated interaction among these pathways occurring at a thalamic level, thus defining a neuronal network of functional utility. Modification of pattern in these simpler functional units was brought about by conditioning impulses from both superficial and deep receptors and from parts of the cortex other than those from which recordings were being made. Ruch, Patton and Amassian (119) then discuss the concept of topographical localization as fundamentally functional.

Magoun (30, 86), an anatomist, has developed a concept of subcortical interrelationships which is of profound importance to the theoretical knowledge of EEG function. In their investigations, Magoun and his associates have demonstrated the existence of a "reticular activating system", an axonal system lying in the central, oldest portion of the brain stem, which when stimulated produces changes

in electrical cortical activity associated with behavioral changes or with changes in the level of awareness in the monkey and the cat. Stimulation of this area produced simultaneous changes in behavior and in the EEG—the changes which are characteristic of normal awakening. It is implied that, by this mechanism, normal states of sleeping appear when there is little activity within the system; arousal occurring when an increase in stimuli is produced from any one of the many receptor areas.

Finally, in the same volume, there is an article by Lashley (74), a psychologist, on the functional interpretation of anatomic patterns. Knowledge of functional and structural patternings is compared, and the system differences are outlined. Indications for further synthesis of neurology and psychology are given.

Jasper (60) has utilized the concept of Magoun in discussing the mechanisms of cerebral integration and the relationship of resting rhythms to consciousness. His statement that it is disappointing "to find the pattern of the electroencephalogram relatively normal in patients with severe mental disturbances" is, perhaps, uncritical in this respect, but his emphasis on the fact that any disturbance in mental activity which relates to consciousness is immediately related also to changes in spontaneous EEG rhythm is undoubtedly accurate. In a scheme which, as he states, is oversimplified but useful, the cortex is depicted as receiving impulses from direct sensory input and from various subcortical neuronal pools. Both "elaborative" and "correlative" systems within the cortex then become involved (fig. 1). "This process of elaboration is apparently not simply a



Schematic diagram of relations between specific thalamocortical projection systems and the brain stem (including diencephalic) reticular system. Collaterals from the afferent pathways into the reticular system are shown, as discussed by Magoun. Separate projections from the thalamic reticular system are shown overlapping those of the specific systems. Projections from the elaborative (e.g., peri- and parastriate visual cortex) and correlative ("association areas") back into the central reticular system are indicated, as well as the return connections to the specific nuclei.

FIG. 1. Diagram of thalamo-cortical relations (60, p. 238)

direct spreading of impulses outward into cortex surrounding the receiving areas, but involves cortico-thalamo-cortical circuits of to-and-fro projections. The impulses then enter a complex network of circuits which have been labeled correlative to signify the process of integrating or abstracting from specific sensory channels the perceptual images and universal concepts which give meaning to conscious thought and experience. Here again cortico-thalamo-cortical circuits play an important role. We now find, however, a far more important participation of the diencephalic reticular system, which receives its most important projections from areas of cortex which have correlative functions, particularly from portions of the frontal and temporal lobes. In addition, the separate projections from the reticular network exert an independent regulatory action upon the reactivity of the cortex as a whole."

Summarizing the findings of another symposium on the EEG and psychiatry, Rioch (112) emphasizes the part played by the electroencephalographer as a participant in the compilation of data which can be presented in operational terms. The bits of data so accumulated are the result of careful and complete observation which is a method of exploration which has many advantages over that of the clinical deducer. He points out also that the EEG is the most reliable method of identifying sleep and feels that the studies on catatonic schizophrenia and on the psychopath are worth considering both in relation to the information about such disorders and to the identification of the human subject with his environment and with other humans. Ostow (102) becomes more particulate in his review of the literature relating to the EEG and normal variations in psychic function. His conclusions are to the effect that in the waking state EEG frequencies, notably the amount of alpha activity, are altered only by the degree of "constructive cerebration". Readiness for cerebration increases alpha activity which is diminished by the cerebration itself. He thinks that affective states *per se* are unrelated to EEG pattern but that the state of cerebration evoked by the affective state may then alter the EEG.

Walter (133), in discussing the physiology of mental mechanisms, utilizes much recent information in another way. He states that the mechanisms of the brain are now being considered from three important points, all of which relate to the brain as an organ for handling signals. First, it has the capacity to compress a variety of information into a single channel by means of modulation, scanning and coding systems. Second, it utilizes the "feed-back" mechanism whereby incoming impulses, through reverberation, become prolonged and altered, the effector and receptor being joined in such a way that the receptor can both stimulate and be stimulated by the effector. The third concept relates to memory and its mechanisms. The author states, "Not much imagination is needed to realize that a machine combining all these characteristics in any considerable degree and in a variety of modalities would behave in an extremely intelligent and purposeful way."

Brazier (14) considers neural nets and the integration of behavior as related to society. She outlines many of the mechanisms discussed by Grey Walter and proposes patterns whereby the neural nets which carry impulses may either interact or conflict. Those mechanisms may be physiological or psychological and may have wide sociological implications. The brain is not "empty" but is filled with patterns which have been organized, then subjected to "conflicts" by inhibitory and excitatory interaction through the different circuits. "That these are problems which concern the psychiatrist is inescapable. The analogy to many conditions in the neuroses is clear. The disturbances of association with the suggestion of inefficiently working inhibitory links; the continuously circulating worry with the failure of effective discharge, in anxiety; the absorbtion into inappropriate association of stimuli from particulars, in paranoia; the profound disturbances of memory, in some neuroses; and the common experience, for which one does not have to go to the neuroses, of the conflict between intellectually established universals and emotionally conditioned ones: All these suggest themselves as pertinent for study in this light."

The general background mechanism for an interrelation between neuronal functional patterning—the EEG—and psychological phenomena has thus, during the past five years, become greatly clarified. Crystallization of

philosophical, psychological and neurophysiological concepts has produced a common ground for reflection and speculation. The EEG has been considered as an objective record of functional activity within the cerebrum which, as such, is vital to the progress of understanding in this field.

Technical progress

Much additional knowledge about the electroencephalogram is the result of more exact technical methods. Refinements of technique in recording and analyzing brain waves have grown up as the result merely of the large accumulated mass of empirical data. A note on the reliability of electroencephalographic judgments (10), in which there are varied interpretations of a single record by different interpreters, has called attention to the latitude existing in this matter. The different amplifications used by different laboratories have been thought to be another cause of inexactness (64).

Methods of appraising the reactivity of the EEG have become more accurate. Their diagnostic value in interpreting pre-clinical forms of seizure patterns is now great. The old method of hyperventilation is no longer the sole means of cortical sensitization. The use of Metrazol as a potentiating agent was described by Gastaut (35) and has been refined by many other investigators. Photic stimulation has become even more widely used (95, 96, 103), as will be amplified later. In a large series of normal subjects, Buchthal and Lennox (17) have found potentiation by either Metrazol or photic methods reliable and useful in differentiating individuals suitable for army life. Mundy-Castle (96) finds photic stimulation of particular value in analyzing the EEG's of children.

The type of response in the EEG which is produced by electroconvulsive treatment (ECT) (117) has been found to relate to prognosis in certain patients, and barbiturate anesthesia has seemed to heighten these significant EEG differences (116).

The use of a frequency analyzer which records the amount of energy produced by the EEG at various rates from the slow 2–3 per second delta activity to the most rapid rates of 20–30 per second has become very valuable. Previous to the present era, it was known that fast activity occurred in certain types of psychological disorders, but the use of frequency analysis brings forth much more marked differences, as will be cited later (57, 66, 111, 132).

Improvement in technical exactness of psychological tests has also modified present knowledge in this field (54). It is now possible to relate detailed analyses of personality to EEG patterns (66, 111). Because of advances in experimental psychology, we are now able also, to utilize Pavlovian concepts of conditioning in the analysis of psychopathological processes (33). The projective techniques such as the Rorschach test have become widely used and objectively appraisable. Statistical evaluation of EEG data has been amplified (41).

EEG and Psychiatric Diagnoses

Normal variants

During the past five years, definition of a "normal" EEG has become more exact. The "borderline" category which once comprised about 10 to 20 per cent of any laboratory series is now much less frequently used. We have become more certain of the meaning of normal variants in EEG pattern. As is to be expected in all empirical matters, more exact relationships to concomitant findings have been established.

It has long been known that the EEG pattern does not mature into its fixed and relatively stable form until late adolescence, and that, above the age of about 50, normal patterns contain more fast activity and lower amplitude than those of younger ages. Ellis and Last (28), basing their study on an analysis of frequencies, or relative rates-per-second, in 100 normal adults aged 16–61, find significant relationships. There is a higher incidence of fast activity among the females, and more in the left hemisphere than in the right. They find that theta activity, at 4–7 per second, is coincident with a 14 per second wave form, as have other observers. Alpha activity appears relatively independent in their records, but the higher frequencies above 16 per second are interrelated in such a way that the prevalence of one higher frequency is usually associated with that of several others.

Mundy-Castle (94) had much the same findings in the records of 161 young adults, of

mean age 22.4 years, and 50 normal older subjects, of mean age 75.1 years. Theta activity appeared to some degree in 64 per cent of the younger group and was enhanced significantly when unpleasant situations were imposed upon the subjects—difficult arithmetical problems, the discomfort of photic stimulation. There was far less theta activity in the records of the older group—26 per cent—which was to be expected, as some theta activity has always been found normally in the records of the young adult. But, of the 12 senile subjects showing theta activity, 10 had abnormal EEG's. It is therefore suggested by the author that theta activity in senility represents a different phenomenon from that which appears at younger ages. It was significantly more frequent among females than males. Beta activity, above 14 per second, occurred in 53 per cent of the records of young adults and in 62 per cent of the older group. Fifty-one per cent of the younger group showed variations in beta pattern as related to alpha variation with visual and/or mental activation.

In another study Mundy-Castle, McKiever and Prinsloo (98) compared the EEG's of normal African natives and Europeans in South Africa. No significant differences appeared between the two groups either resting, during hyperpnoea or during photic stimulation

There are a number of other studies of the EEG and old age. Mundy-Castle and his associates (97) have compared the records of 50 mentally normal old people with those of 104 patients suffering from senile psychoses. Twenty-four per cent of the normals and 54 per cent of the psychotics showed EEG abnormality. The observation that the incidence of abnormal EEG's among depressed and paranoid seniles was not significantly different from that in other forms of senile psychoses was adduced as favoring a common etiology, and this most probably on an arteriosclerotic basis. McAdam and McClatchey (83) report similar findings. Of 65 aged patients in a mental hospital, 15 had abnormal slow activity in their EEG's. Thirteen of these showed intellectual deterioration. But, of the 50 having normal EEG's, only 3 showed signs of intellectual deterioration. A low alpha index in 16 patients was associated with restless activity, while of 31 with a relatively high alpha index, 25 were considered passive, inactive individuals. Of the remaining 6, 4 were manic-depressive.

Obrist (100) found an increase in the slower rates of alpha activity with age in 150 normal males. With age there was also a reduction in per cent time alpha and diminished or absent response to hyperventilation. Silverman *et al.* (124) report similar findings in relation to age and discuss the frequency of temporal lobe abnormalities among this older group. They find that there is some correlation between diffuse brain dysrhythmia and impaired psychic function, but that in the cases with temporal lobe dysfunction there is often no sign of psychological disturbance.

It is thus evident that normal individuals over the age of 60 gradually acquire a different pattern of wave-form from that of younger individuals and that this difference is greatly altered and magnified among the senile psychoses.

Disorders of behavior

A correlation of EEG abnormality and disorders of behavior has long been known. It has been more accurately analyzed during the present five-year period. Hill (47, 48) has emphasized the factor of maturation in interpreting the EEG's of delinquents, suggesting that immature behavior and EEG immaturity coincide. He emphasizes that "all EEG recording is in the nature of an experiment in which present time and its accompanying events must be acknowledged"; that the EEG must always be used as an instrument of function rather than structure and that, as such, the value of its interpretation in maturation and in other matters relating to behavior is very great. Theta activity, often intermittent and appearing largely in the temporal region, was thought to be directly related to aggression, as will be discussed later. Hill's suggestion (48) that an organic developmental failure may be the common basis for deviant behavior and EEG pattern implies a predetermined basis for behavior with relatively less response to the environment.

In many cases, EEG abnormalities in disorders of behavior are known to disappear in the young adult ages. This also suggests the factor of late maturation. Cattell and Pacella (18) report a notable increase in abnormalities in the EEG of the delinquent

child, but their clinical diagnostic categories are indefinite and their series small. In another series (79) during the ages 20–25 the EEG abnormalities in a group of primary behavior disorders dropped from 50 to 20 per cent. That of schizophrenic adults fell little below that of the schizophrenic children and adolescents.

Knott *et al.* (71) believe that the abnormal EEG's found in disorders of behavior and in psychopaths have an important genetic factor. This is based upon the examination of 86 children and their parents. Fifty-four per cent of the children had abnormal EEG's, many of them showing slow wave-forms. There was a significant increase in the incidence of parents having slow waves whose children had similar slow patterns.

Psychopathic personality

The EEG's of the adult psychopathic personality have been discussed many times, but there has been much confusion, largely as the result of clinical reporting which has used terms and measurements of clinical conditions which varied with the school of psychiatric thought of the investigator. Although this difficulty has become less during the past five years, the definition of the psychopath is still one on which there is much disagreement. For the purposes of this discussion, these offenders against society are now divided into two clinical groups, the pure psychopath and the aggressive psychopath, solely because these correspond to particular EEG patterns.

The *pure psychopath* is defined by Lauretta Bender (8) as the individual who is delinquent or in difficulty with his environment because of his lack of recognition of social rules and their implications. This is based on an attitude of immature narcissism in which he lives entirely in the present. He is unable to relate to other individuals and has had this characteristic for his entire life. He has minimal anxiety and in this respect is sharply differentiated from the young schizophrenic or neurotic, whose disorder of behavior is primarily related to anxiety and guilt. His number is great through adolescence and young adulthood. He is relatively rare above the age of 30.

Such individuals, as selected by the Minnesota Multiphasic Inventory (46), are found to have an unusually high incidence of alpha activity. Of 100 prison inmates, 30 per cent had abnormal EEG's and 20 per cent showed records with a high alpha index (80). Records of the latter type have been previously related to passive, accepting, non-worrying individuals or to those having peptic ulcers (68).

Palmer and Rock (105) confirm this relationship in a study of 25 males with high alpha index. These individuals showed a specific psychiatric pattern. All were passive and accepting of authority; many were immature; many used alcohol; 11 had never married, 8 of whom were over 33 years of age. All were thought to have a defective ego and to be unable to express their masculinity or aggression. This was said to result from an early unsuccessful identification of the child with his father. It is of interest that lack of identification with others is the factor given by Bender, also, as causative in the production of the pure psychopath. In another study (66) which compares a group of prison inmates with a second group of mental hospital patients, a high alpha index in the prison group is, again, positively related to absence of anxiety and to psychopathic qualities of personality.

In contrast the *aggressive psychopath* is clinically the immature individual who is conspicuous for his intermittent and at times paroxysmal, aggressive rages. These are the young individuals who reach the penal institutions or mental hospitals because of acts of aggression against their environment. As will be seen later, they may be related etiologically to individuals with temporal lobe foci who show psychomotor epilepsy. In their article *A Contribution to the Nosology of the Impulse Disorders*, Frosch and Wortis (32) describe this clinical entity and cite examples having abnormal EEG's.

Hill and his associates (48, 49, 52, 110) first described theta activity in excessive quantity in the EEG's of many such patients. In examining the incidence of abnormal EEG responses to auditory stimuli during sleep Grossman (44) has found a relationship between such abnormal responses and aggressive behavior. In these cases the posterior association area produced the spontaneous 6–14 per second positive wave-spikes which were, previously described by Gibbs and Gibbs (39) as related to aggressive paroxysmal

behavior. Paroxysmal, spontaneous, positive spike-potentials appeared during sleep in a number of patients as the result of what Grossman describes as a pathophysiological condition. Such patients also produce bursts of positive wave-forms as the result of auditory stimuli during sleep. Paroxysmal behavior and EEG patterning occurred simultaneously in one patient who, following stimulus, awoke to give a typical performance of rage and aggression. This pattern is compared by the author to one seen in cases of organic brain disorders which have similar EEG changes to auditory stimuli during sleep. In the patients with organic disorders, however, the paroxysmal wave-forms are confined to one focus in a single hemisphere, while in the subjects with episodic behavior they are bilateral.

Jarvie (59) discusses episodic rage, theta rhythms, and obsessive behavior. The description is given of a single case in whom paroxysmal rage occurred together with severe obsessional patterns and associated with a high incidence of theta activity in the EEG. The literature relating compulsive states and EEG abnormality is cited.

In the light of the above-described relationship, the report of Kirschbaum and Stehle is of interest (68). These authors examined the EEG's of 60 male patients with either peptic ulcers or functional gastric disease. Of these, 8 per cent showed 14 or 6 per second paroxysmal activity during sleep. This was related to a conspicuously poorly functioning autonomic system in each case. The suggestion by previous authors that it is the result of thalamic and hypothalamic dysfunction is discussed, and convincing evidence presented that it is subcortical structures which integrate this type of EEG pattern.

A very good review of the status of a group of young delinquents who probably fit clinically into the present category is given by Hodge, Walter and Walter (53). One hundred successive admissions to a school for delinquent boys were examined by means of electroencephalography and by an inventory of psychological and sociological factors. Eighty four per cent of the EEG's were abnormal. The correlation with psychological assessment appears valid. It is unfortunately difficult to appraise in relation to other studies because the categories used and values given are unique to the study and exceedingly complex.

Psychoses

Prior to the five-year period presently under review, it was the opinion of many that the EEG's in psychoses, notably in schizophrenia, were far more often abnormal than in the non-psychotic population. This impression has been reinforced and analyzed during the present period. In one series (65, 79) the EEG's of schizophrenics have been found to be abnormal in between 30 and 50 per cent of cases, depending on heredity, severity of disorder, age at onset, and duration. Increased beta activity (40), instability, and/or dysrhythmia appear most commonly in such records.

Because both clinical entities tend to produce these characteristics, there has, in the past, been much comparison of epilepsy with schizophrenia. The use of potentiating stimuli such as Metrazol and flickering light has been shown to produce signs of increased cortical excitability in each group, and the threshold to both Metrazol and light has been found to be lower than normal in each (21, 75). Threshold to insulin is lower (55). The degree of clinical recovery following insulin therapy is in some measure related to and dependent on this factor as recovery is always greater in those subjects in whom insulin seizures are relatively easily induced.

Chamberlain and Lyketsos (19) have examined the question of maturity in relation to insulin threshold. They produced insulin coma in lower doses in those individuals who had the immature type of EEG record, particularly those containing theta activity. These same patients showed, prior to treatment, a greater EEG instability and more pronounced response to hyperventilation. "It may be, the presence of theta activity in the more insulin-sensitive groups of our patients' EEG's is related to markedly defective homeostatic mechanisms which would render these subjects less able to resist the effects of insulin."

In manic-depressive cases, Hurst, Mundy-Castle and Beerstecher (57) have found a correlation between fast alpha rate and manic phases, and a slow alpha rate in those subjects tending to become depressed, but there was no shift in pattern to correspond to the im-

mediate psychological state of the subject. There are a number of reports which indicate the incidence of abnormal EEG's among neurotics (also 66, 99, 111). Gunnarson and Melin (45) find enuresis in children associated with EEG abnormality and that the incidence of abnormality is greater in the more severe cases. Their study was based on the examination of 90 cases without organic contributing focal factors.

The importance of the genetic factor in relation to the EEG's of psychotics is discussed by Chamberlain and Gordon-Russell (20). In their study the incidence of EEG abnormality was as follows: 45 schizophrenics—45 per cent EEG abnormality; their 45 siblings—31 per cent; their 53 parents—7 per cent; and 43 controls—11 per cent. The mean ages of the patients, siblings, and controls were similar. When the EEG abnormalities of the relatives were scored according to age, those less than 20 years of age had 35 per cent; ages 21–40 had 30 per cent; and those above 40 years had 7 per cent. Those siblings of patients who had abnormal EEG's also had a significantly higher rate of EEG abnormality. In another series of 100 schizophrenics (66) EEG abnormality was significantly greater in those patients who had a parent or sibling who was also psychologically disturbed. Hurst (56) discusses the EEG support of a genetically-oriented organic concept of schizophrenia. His emphasis is on the organic background of schizophrenia and its consequent genetic implications. He compares the presence of the choppy fast activity found in schizophrenics and originally described by Pauline Davis with similar wave-forms found in organic disorders of the nervous system. It is absent in "normal controls". This series is a large one—243 schizophrenics, all South African natives. In a later publication Hurst, Mundy-Castle and Beerstecher (57) reported the EEG findings on a group of 117 manic-depressives and involutional states. Again, there was more low-voltage, fast activity among patients than among controls, but there was no shift in alpha frequency corresponding to changes in psychotic state. Predominantly manic patients showed significantly greater incidence of second and third harmonics and of response to stroboscopic stimulation at 14–26 per second than did predominantly depressed patients. The manic-depressives, like the schizophrenics, showed a high incidence of abnormal wave-forms, 24 per cent being abnormal and 21 per cent borderline in this series. These authors have materially increased the exactness of their findings by the use of a frequency analyzer in addition to their EEG recorder.

In a study by Hill and his associates (50, 51) the many qualities of the EEG which appear less stable in the schizophrenic are examined. The schizophrenic EEG is shown by them to have more variability in single individuals and wider group variations than does that of the normal. They have induced hypoglycemia in their subjects and recorded EEG's, heart rate, and galvanic skin responses. Their findings are that in the schizophrenic: 1) The depression of cortical function in hypoglycemia is delayed; 2) The excitability of the central sympathetic-adrenal system is less; 3) The integration of function whereby the progressive depression of cortical activity is followed by the discharge of an increasingly excitable sympathetic system is defective; and 4) That these variations bear a relation to the clinical state of the patient which is most apparent in catatonic stupor.

Bonkalo, Doust and Stokes (11, 12) support this thesis of defective homeostasis in the schizophrenic. Observing the same patients many times over a period of years they find that during the inception of and at the height of the catatonic phase the EEG becomes first unstable and then greatly slowed. A lowered state of metabolic and homeostatic activity is suspected. Rowntree and Kay (118) have found a similar fluctuation in EEG pattern in two patients, one a catatonic, who passed in and out of schizophrenic episodes.

Organic states

The evidence contributed by the EEG's of individuals with known, focal, organic, cerebral disorders is important here. Cerebral dysfunction as a result of general metabolic changes, another type of organic disorder, must also be considered. The rationale for either type of study lies in clinical experience since many such disorders produce alterations in cortical activity which, usually, lower the threshold of cortical excitability. Epileptic seizures, clouded consciousness, coma and the like are all ac-

companied by EEG changes. It has been long demonstrated that subclinical changes may appear in EEG patterns.

The effects of alterations in systemic blood pressure have been studied. No change in EEG was found by Morello, Merlis and Cooper (92) when experimental vasodilation and fall of blood pressure were produced in man. Many studies of hypertension have been made, all of which are in agreement. Hypertension, alone, hypertensive headache, and retinopathy are all significantly related to EEG abnormality, but those individuals who have clinical signs of cerebrovascular insufficiency on a hypertensive basis show a far higher incidence of EEG abnormality (3, 4). Such patients, having an abnormal EEG preoperatively, are likely to show clinical signs of confusion following splanchnicectomy. In the series of Roberts and Walker (103) 52 per cent of 104 patients with hypertension had EEG abnormality, but 82 per cent abnormality occurred in those showing additional signs of cerebrovascular disease.

The effects of cortisone and ACTH on the EEG have been examined because of the personality changes known to occur at times during treatment. Pine, Engel and Schwartz (108) found no change in EEG abnormality in a series of 37 cases examined before and after ACTH and cortisone treatment. Friedlander and Rottger (31) observed similar absence of effects in 16 cortisone-treated patients. Both articles by these authors emphasized the fact that during and after treatment there was more alpha activity and more regularity of pattern than preceding treatment. This is discussed in relation to stress phenomena. The latter authors state, "No tracings that were abnormal during the control period reverted to normal and no normal EEG's became abnormal—however, the more the control tracings deviated from normal, the greater was the change during treatment and this change was usually in the direction of normality."

Since hypoglycemia may produce epileptic seizures, a low blood sugar of less extreme nature may be expected to produce subclinical changes visible in the EEG tracings. Ross and Loeser (115) carried out a careful investigation of individuals showing functional hypoglycemia. All of the 19 cases presented symptoms which appeared episodically five to six hours after food ingestion. All had normal basic blood sugars, but glucose tolerance tests showed that during the five-hour period blood sugar levels fell below the patient's critical threshold; at this time EEG changes occurred, and these could be prevented by glucose ingestion. Fabrykant (29) describes a condition termed Labile Diabetes in which patients exhibit extreme instability in blood-glucose regulation. Of a group of 15 such patients, 12 had abnormal EEG's and "almost 50 per cent" had either convulsive patterns or focal EEG pathology. Three had an apparent genetic factor in the disorder. "The distorted patterns in the patients were attributed to disturbed brain function resulting from severe repeated insulin reactions." This latter statement is of interest as no such change in cerebral pattern is commonly expected following insulin shock therapy.

The field of other disorders of a physical nature which are related to emotional status has been explored. Taylor and Pacella (128) found that 84 per cent of 56 patients with scleroderma had abnormal EEG's, possibly related to calcium metabolism. Chobot, Dundy, and Pacella (23), confirming earlier work, found abnormal EEG's in 33 per cent of 80 allergic children. Furthermore, 38 per cent of their 42 relatives from 22 families also had abnormal EEG's. There was an increase in number of abnormal EEG's in those children with symptoms of longer duration, and the family abnormality tended to appear in those families having patients with abnormal EEG's. Fifty per cent were in females, but only 35 per cent of the normal records belonged to girls. The type of EEG was not altered by administration of antihistaminic drugs.

Headache, or migraine, has been observed in relation to the EEG. Weil (134, 135) has discussed dysrhythmic migraine and psychosomatic headache. He reviews the literature related to the subject, many authors having previously reported a high percentage of abnormal EEG's in true migraine. Eight of Weil's 31 patients, or 26 per cent, had abnormal EEG's. The name dysrhythmic migraine was given to this group because of the paroxysmal character of the slow waves which appeared.

Ulett, Evans and O'Leary (130) have su-

veyed the EEG findings on 1,000 patients with chief complaint of headache "of presumably nonorganic origin". The number of disordered tracings was 9.7 per cent in males and 20.5 per cent in females. This was not related to severity of symptoms, but vomiting was a symptom associated with a significantly higher incidence of EEG abnormality.

There are many analyses of the value of the EEG as related to the field of differential diagnoses between true focal organic disorder and the "functional". One of the best is that of Monnier (90) who, discussing the organization of psychic functions, gives the background of physiological organization within the nervous system as related to homeostasis and to psychic fluctuations. He describes the temporary changes which are associated with sleep, waking, tension, anxiety, and then suggests the relationships of such phenomena to memory, learning and various psychopathological conditions.

Ostow and Strauss (104) offer a similar discussion of the value of bilateral EEG abnormality in diagnosis. They distinguish bilateral slow abnormality from other types and relate the slow phenomenon to diffuse cerebral disease only when the waves are not bilaterally synchronous. They implicate the diencephalon since the disturbance is generalized and may follow on any one of several generalized disorders which are either metabolic or associated with pathology within the central nervous system.

Stehle (126) has attempted to assess the value of the EEG in differentiating neuroses from organic brain disease. The group of 263 neurotics examined had all been referred for EEG because of the possibility of organic brain dysfunction and were not therefore representative of any general sample of neurotics. All had somatic complaints which varied from headache to blackouts and seizures. Sleep records revealed a 19 per cent "significant" abnormality, with clinical correlation. The value of the EEG in such cases, for this author, rests in its ability to single out certain focal organic causes which are otherwise diagnostically confusing.

Rondepierre (114) also presents a series of cases in which diagnostic aids have been sought for questionable psychological disorders. His conclusion is that the EEG is almost essential for such cases because of its value in ruling in or out focal, structural pathology. He recommends its use in the diagnosis of cases involved in criminal procedures because of the relationship of agressive performance and EEG theta activity.

From studying the material of this section, one is led to the conclusion that there are many disorders of a psychosomatic nature which have coincident EEG abnormality; that in many instances these changes can be related to metabolic or biochemical phenomena such as a change in blood sugar level; but that the functional element seems primarily related to some EEG patterning for which no organic cause has yet been found. In some cases genetic patterns seem involved.

Relationship of EEG to Physiological Processes

During the past five years the EEG, the record of total neuronal activity of the brain has been related by many methods to the simpler and more fundamental unit electrical circuits of the central nervous system. Much of this has been done through animal experimentation which will not be discussed here. There have been similar types of analyses of the human EEG.

Consciousness

Previous to the present period, it had been clearly shown that states of wakefulness, drowsiness, or sleep altered the specific EEG patterns in a predictable manner. States of attention, or alterations in attention, had also been shown to affect the EEG. The waveforms of many epileptics had been found to be relatively more paroxysmal and less normal during drowsiness or sleep.

Davis (24) discusses the rhythmic waveforms produced by the brain as part of a homeostatic mechanism. Sleep and waking are rhythmic phenomena, the extremes of which are coma on the one hand and epilepsy on the other. It is suggested that the rapid, rhythmic, alpha and beta patterns are part of a homeostatic adaptation and that there is a seeking process in which reverberating adjustments are attempted by the neuronal circuits; a neuronal "sense organ" within the central nervous system being the mechanism whereby adjustment takes place.

Since the temporal lobe and theta activity are specifically related to sleep, the findings of Wyke (138, 139) are important. In his series the patterns of artificial sleep produced by barbiturate narcosis are similar to those of normal sleep. Theta activity appeared early in the sleep sequence but was absent during waking periods. It always appeared first in the temporal lobes, whence it spread as sleep deepened, and was eventually recorded from all cortical regions. The 14 per second complex often associated by others with the theta rhythm appeared first, in Wyke's series over a wider area involving parietal and posterior temporal areas. It occurred before the theta activity in the sleep sequence. It was suggested by the evidence that "while in the waking human brain different cortical areas do not usually possess well-defined electrical entities, during the onset of sleep they pass through a period when they may assume more or less independent patterns of electrical behavior, the pattern of electrical activity at each stage of sleep being characteristic of that particular region."

Knott, Hayne and Meyer (70) examined the time relationships of sleep patterns recorded from scalp, thalamus and basal ganglia in 8 patients. They confirm the observations of others that induced sleep patterns cannot be distinguished from those of normal sleep. The earliest changes were detected almost simultaneously in the thalamus and corpus striatum. Comparable cortical changes lagged behind for a period of from 4 to 9 minutes. During the offset of sleep the waves changed in reverse pattern and "a residue of fast waves was demonstrated in the deep nuclei several minutes after the cortical potentials had returned to normal and the patient had awakened." This paper is then additional evidence that, during sleep, cortical activity becomes non-dominant and that subcortical, less-specifically organized areas assume control.

Williams and Parsons-Smith (137) have examined this matter in the EEG's of two patients who exhibited periodic akinetic mutism and stupor of unknown etiology. During the stuporous stage and during recovery, records were made from the region of the thalamus as well as from the cortex. Spindle formations appeared in the posterolateral region of the thalamus during stupor only. They were associated with episodic waves in the cerebral cortex. It is suggested that the disturbance of function lay in the ascending reticular system as described by Magoun.

Bremer (15) confirms the finding that sleep is accompanied by changes at a subcortical level. From his observations on both human and animal subjects, sleep occurs or may be produced by the exclusion of the bulbomesencephalic portion of the reticular system. Doust and Schneider (26) in a study of the physiology of awareness compare sleep patterns with those induced by cerebral anoxia and suggest a common background mechanism.

The patterns seen in some cases of atypical epilepsy, in which alterations in consciousness are prominent, add information here. Gibbs and Gibbs (39) discuss the evidence for thalamic and hypothalamic epilepsy. In studying sleep records of such cases they find positive spike discharges at 6 and 14 per second. Those of 14 per second appeared regularly during drowsiness while the 6 per second appeared later in 6 per cent of patients having clinical epilepsy and in two per cent of normal control subjects. Such spikes are considered, as cited above, to originate in thalamus and hypothalamus. Clinically, attacks of pain, rage and vegetative symptoms are common in such patients. All are phenomena which may be related to these subcortical nuclei, but the attacks do not appear identical with psychomotor seizures.

In a discussion of epileptic automatism, Penfield (106) describes a "centrencephalic" area which is functionally related to all receiving areas of the two hemispheres. That such a mechanism, related to conscious perception, is one affecting psychological status is implicit in the meaning of the term consciousness. Analysis of the sleep records of psychotics has confirmed and amplified the above findings (82, 109). An earlier opinion, that the EEG's of schizophrenics resemble those of epileptics because of their paroxysmal instability, is reversed in one respect by this study. EEG's recorded from psychotics during sleep showed no evidence of epileptic disorder and no slow wave foci in any specific region. The only significant findings were a lower voltage of sleep patterns among psychotics and a higher incidence of abnormally fast activity among

schizophrenic patients than among other psychotic patients or controls.

The evidence, from all the above rather diffuse testimony, is to the effect that the physiological mechanism governing sleep, waking, and the many other variations in conscious state is one of diffuse effect, involving subcortical as well as cortical areas; and that the basal thalamic and hypothalamic nuclei may be the site of the trigger mechanism. Furthermore, evidence is offered that this is brought about by the integration of incoming afferent stimuli within a central "activating system".

The changes in brain-wave pattern accompanying hypnotic sleep and wakefulness are described by Barker and Burgwin (7). They confirm earlier findings. "The brain-wave patterns observed during the induction of hypnosis, defined as securing appropriate response to suggestion, indicate that the subject's interpretation of 'going to sleep' resulted in a physiologic state quite different from that of normal sleep. Hence the subject was explicitly told that ordinary sleep was desired and suggestions were directed at establishing muscular relaxation and loss of sensory contact with the environment." Under the latter circumstances, the brain-wave patterns of hypnotically-induced sleep resembled exactly those of true sleep. Other changes in EEG were produced by the suggestion of subjective sensory experiences which were similar to those appearing when the objective stimulus was applied in the non-hypnotic state.

Peterson, Sumner and Jones (107) examined a group of patients under hypnosis and observed: 1) persons with psychogenic seizures hypnotized more deeply and easily than any other type; 2) true epileptics, when hypnotized, were unable to recall the details of their seizures; but 3) persons with psychogenic seizures could recall, while under hypnosis, the details of their attacks. "There is a highly inverse correlation between the ability to recall under hypnosis the details of seizures and EEG findings compatible with idiopathic epilepsy."

Temporal lobe

The problem of temporal lobe function has been examined by more investigators during the present period than has any other topic. The frontal lobe, which was the focus of attention just previously, has become relatively less thought about. There are many phases of the study of temporal function, all of which relate to distortion of awareness or of performance when there is temporal lobe pathology. Theta activity appears first in the temporal lobes and is associated with aggression. Psychomotor paroxysmal behavior patterns are related to lesions in the temporal poles and are relieved by the surgical removal of the temporal abnormality (6, 36).

Psychomotor seizures are now known to be far more common than was previously thought. Of 1,900 office patients with epileptic symptoms seen by Lennox (76), 20 per cent had a history of psychomotor seizures. Sixty-three per cent of this psychomotor group had also grand mal seizures, and, with an increase in age, there was an increase of psychomotor seizures in association with other types. Acquired brain pathology antedated the onset of epilepsy in 33 per cent of patients having both grand mal and psychomotor seizures, but in only 15 per cent of those having associated petit mal. The per cent of organic injury was higher in those patients having psychomotor epilepsy and grand mal together than in any other group with either a single type or another combination of epileptic patterns. The suggestion is that psychomotor seizures may arise from damage to a temporal lobe, possibly as the result of earlier convulsions, anoxia, trauma, or infection.

In an army consultation service, Kahana and Robertiello (62), during two months, examined 19 persons with psychomotor epilepsy, forming 56 per cent of all convulsive disorders seen and 2.9 per cent of all patients. In the series of Jasper (61), seizures arising in the temporal lobe, including the uncinate and hippocampal areas, occurred in about 20 per cent of all epileptics and in about 50 per cent of all those with cortical focal EEG abnormality. Less than one-half of this group had attacks of automatic behavior.

The pattern of psychomotor seizures has been analyzed by Golub, Guhleman and Merliss (42). These phases are described in their attacks, all of which relate to psychological phenomena. The first is a stage of suspended activity which is not unlike that of petit mal. The second phase is one of repetitive, stereo-

typed activity, and the third is that in which behavior is complex, semi-purposeful and variable. This last phase is usually post-ictal confusion.

During the five-year period, the literature in relation to surgical procedures and temporal lobe epilepsy is very large and, on the whole, convincing. Bailey and Gibbs (5) emphasize the fact that psychomotor seizures are often related to multiple foci on one or both sides and that improvement only results when several or all have been extirpated. Gibbs (37, 38) reports that analysis of 458 cases having EEG evidence of focal seizures reveals that the anterior temporal region is more vulnerable than any other region to the type of injury which results in focal discharging lesions. Ninety-five per cent of their 163 cases having focal seizure activity in the EEG's in the anterior temporal area had also clinical psychomotor seizures. This is eight times as great as the association between psychomotor seizures and epileptic fits in any other part of the cerebral cortex. Furthermore, psychiatric disorders were more than three times commoner in cases with focal disturbance in the temporal lobe than in cases with foci in any other area. "Non-ictal psychiatric disorder is not temporally associated with EEG abnormality, but the seizure discharges provide a clue to the anatomical locus of the psychiatric disorder." The fact that in many cases paroxysmal activity appears in the EEG only during sleep is emphasized also by Gibbs (38) as well as by a number of others (34, 58).

Because the temporal lobe is a very complex structure, having on its lateral aspect a recent association area and within its deep structures a much older rhinencephalic portion, there has been much confusion as to localization within the temporal pole itself. It is well known that when the rhinencephalic area is removed in monkeys, changes in "temperament" follow, and this has been analyzed in relation to human behavior by Klüver (69), MacLean (85) and Penfield (106) among others. Gastaut (36) and his associates deem it necessary to remove the deeper structure, including uncus and amygdala, in order to best relieve psychomotor performance. They state, however, that the EEG focus is more often abolished than is the pattern of clinical abnormality and discuss the bilaterality of function of the temporal lobes in this respect.

The relationship of the temporal lobe to the hypothalamus has also been investigated. Since the hypothalamic area is a proven site of integration of autonomic activity and, at least in animals, is related to affective change such as rage, and since its direct anatomical connections to the temporal lobe are also proven, it is easily implicated in personality structure. Chapman, Livingston and Poppen (22) found such autonomic interrelationship when they stimulated the tip of the temporal pole in a human, at operation, and produced alterations in blood pressure.

In a discussion of faints and fits, (127) Symonds and Williams among others describe the interrelationship of these two entities. Loss of consciousness due to a "faint" may often be on a vascular, anoxic basis, while a "fit" is most commonly of cerebral origin. Yet the borderline between these two ictal phenomena is unclear because of the autonomic pattern common to each. Either may be set off by a purely psychogenic phenomenon.

In a study of the EEG reaction to "l'etat de vigile", an alerting phenomenon, Lairy-Bounes and Fischgold (73) found that the normal alerting response seen in the EEG, either during waking or sleeping states, may be present when there is a lesion deep in the "tronc cerebrale" or in some areas of the hemispheres but that the hemispheral lesion sometimes suppresses the alerting responses, particularly if the lesion lies in the "psychosensory areas" of temporo-parieto-occipital cortex.

The "clouded states" which accompany, precede or follow epileptic seizures are discussed by Levin (78). The clinical picture in his 52 patients was that of delirium with liberation of aggressive or self-destructive impulses, confusion, excitement, or hallucinations. Such psychotic manifestations often lasted many days, but then cleared up spontaneously. Several EEG's showed greater abnormality during the clouded state than subsequently.

Psychogenic motor phenomena associated with an abnormal EEG are discussed from a different aspect by Kessler and his associates (67). A series of subjects are presented, all of whom were studied because of seizures or fits, and all of whom had abnormal EEG patterns.

In the opinion of the authors, the seizures

were not of organic origin since: a) they did not respond to medication; and b) they did respond to psychotherapy. A diagnosis of hyperkinetic hysteria was made and the opinion given that psychomotor epilepsy was not characteristic of either the clinical or EEG picture in this group. The attacks were described as a motor acting-out of aggression. Many of the EEG's showed abnormal waveforms in the theta frequency.

The temporal lobe has been also implicated in non-episodic psychotic states. Bailey, Green, Amador and Gibbs (6) report that ablation of temporal pole foci has improved many cases having chronic personality deviations. The psychiatric symptoms of 100 patients having known focal organic lesions of the temporal lobe are described by Mulder and Daly (93) as distinguished by their paroxysmal occurrence, by their inappropriateness to the total situation and by the association of other symptoms suggestive of lesions of the temporal lobe. In this series, psychiatric symptoms were universal and similar to those seen in functional psychiatric disorders. Only four patients, however, could be classed as psychotic. Two unusual cases are reported by Oldham (101) in which individuals with severe known paranoid delusional states had temporal lobe lesions supervene at a later date. In each case aggressive conduct with violent outbursts gave way to calmness and apparent content as symptoms developed referable to a dominant temporal pole.

The work of Denis Hill (48) in this field also has contributed greatly. His study of paroxysmal outbursts and aggressive phenomena and total personality has produced a differentiation of biological correlates to temporal lobe abnormalities which is exact and has been supplemented by the finding of others cited above. Temporal lobe EEG foci, in the experience of Hill, are more common than similar foci elsewhere. There are three groups of such EEG patterns: 1) diffuse bilateral synmetrical 7 and 14 per second activity which appears in a variety of psychiatric conditions and is not related to specific symptomatology or personality type; 2) abnormal potentials sharply localized to one temporal area; and 3) abnormal potentials localized in the posterior part of the temporal lobe, and usually inferior. The two latter groups contain some individuals with frank epilepsy but many who have bizarre and often hystero-epileptic patterns. The third type, if it shows slow wave dysrhythmia only, is associated with patients who have no periodic disturbances of consciousness.

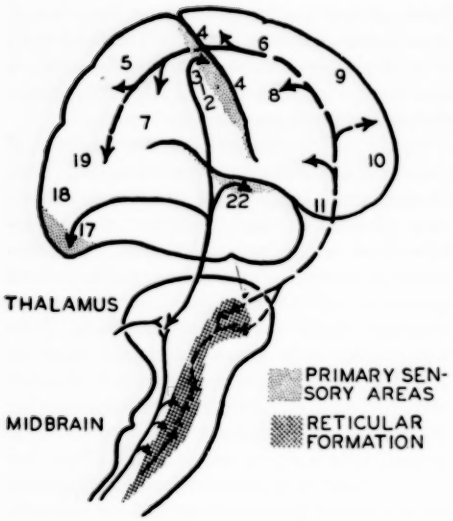
Finally, in the discussion of the patterns of consciousness related to the temporal lobe, Dongier and Gastaut (25) consider hallucinatory phenomena and resultant motor performances which assemble data from surrounding cortical areas. Thus, hallucinations related to concrete visual pictures are perhaps localized nearer to the occipital area; those with more truly psychic illusions may be actually related to temporal cortex. Another differentiation made by these authors is that "psychomotor" automatic behavior is most frequently related to oral manifestations and that this may be in connection with the proximity of the face and mouth area of the cortex to the temporal pole.

Frontal lobes

In comparison with the material on the temporal lobes, there is remarkably little on frontal lobes during the past five years which is of value in the present discussion. Frontal lobotomy, first well established before the period of the present review, has continued to be widely used, and stabilization of previous impressions has occurred.

Such studies as those of Greenblatt (43) covering the results of lobotomy on many patients over a nine-year period are of great value clinically. EEG studies correlate the clinical picture of drowsiness following operation with EEG changes and state that arousal during this period is accompanied by a reduction in the abnormal slow waves. Changes appearing after lobotomy are reversible and usually disappear within a few months. In some instances they remain as long as six months, and this tendency is much greater in those having post-operative clinical seizures.

Margaret Lennox and Coolidge (77) report that the generalized slowing of pattern most prominent in frontal areas following lobotomy disappears after three months. Sleep spindles, prominent during pre-operative periods, entirely disappear during the post-operative one. Adler and Talbot (1) confirm the abolition of sleep spindles by frontal lobotomy and state that in cases where these spindles are not



Schematic representation of direct, or classical sensory relay pathways to primary receiving areas of cortex, and of the diffuse projection system via the brainstem reticular formation. Note the widespread cortical influence of the latter (Moruzzi and Magoun 1949). According to Starzl and Magoun (1951) the recruiting mechanism influences only association areas and the motor cortex, but not primary receiving areas. The brainstem activating system (reticular formation) is believed to receive collaterals from ascending sensory paths, and it is believed to involve a series of tegmental relays as illustrated.

FIG. 2. Schematic representation of possible relay pathways responsible for EEG fluctuations (81).

obliterated, little good is derived from the operation which has, hence, been of too small extent. In comparing standard lobotomy with topectomy or removal of areas 9, 10 and a part of area 46, Krueger and Wayne (72) also found that sleep spindles were abolished following standard lobotomy but to a much lesser degree after topectomy. Clinical improvement in the topectomized group was less than that in the group with standard lobotomy.

RELATIONSHIP OF EEG TO PSYCHOLOGICAL ENTITIES

The greatest advance in analysis of the significance of the EEG in relation to personality structure has been made through the use of psychological material. Following leads developed by clinical observation as to the relationship of personality type to EEG type the psychologists have pursued a more exact method of analysis in this respect.

Lindsley (81) reviewed the status of psychological phenomena and the electroencephalogram in 1952. He stresses states of awareness, varying from acute tension to deep coma and their progressive accompaniment of different patterns of alpha activity. He differentiates between alpha activity and alpha rhythm. The former: "A basic metabolic or respiratory rhythm of the individual brain cell, and its electrical variations alone or in small aggregates of cells, is normally too small to be recorded from the surface of the scalp. When many thousands of these cells respond in unison sufficient summation is attained to produce a recordable alpha rhythm. Low alpha patterns would then represent fractional desynchronization of the alpha rhythm and varying degrees of this might appear." Lindsley offers here what is probably the best physiological explanation of the alpha rhythm and activity to date. Utilizing the facts developed by Magoun and his associates he ascribes differences in rhythmic synchrony to different time relationships of receptor mechanisms of the cerebral cortex. Two systems are involved in this (fig. 2): The direct one, a primary relay system from the environment to the cerebral cortex and back via the motor system; and a second, the activating system which reaches the association areas of the cortex from the basal reticular formation and which, by virtue of the variety of its pathways and synaptic connection, may have multiple delayed and reverberating effects.

There has been much study of the alpha frequency pattern as related to neuronal integration (123, 125). Since the alpha frequency is known clinically to be related to visual stimuli, and since it is of the rate of 8–12 per second which is most easily studied in the EEG, its value in this field is very great. Morrell and Ross (91) have examined conditioned reflexes which are produced when auditory stimuli are conditioned to abolish alpha activity by association with an unconditioned visual stimulus. They have confirmed that the laws previously established in relation to other types of conditioned reflexes apply also to conditioning of alpha activity. By the same means, these authors studied

time relationships of spread of cortical activity from occipital regions to the precentral area using an inhibitory process which could be induced, as demonstrated by the EEG. When the inhibitory stimulus was given, there was a significant delay in cortical conduction. Such a phenomenon, demonstrated here in a relatively simple process, may very easily be the basis for variations in the more complex learning processes of physiological neuronal nets.

Stamm (125) studied the differences between latency of response to light stimulus and delay of reaction, or reaction-time, in man. Using several different tests for reaction and latency of change of EEG stimulus he was able to show that both reaction time and latency-period responded in a fixed manner to such experimental sets, but that there was no significant relationship between the reaction patterns of the two systems. Stamm therefore concluded that reaction times and latent times were measures of essentially independent systems. It is of interest that the latent time was, under some circumstances, longer than the reaction time.

Brady (13) has pursued the analysis of neural reverberatory nets in cerebral function using photic repetitive stimuli. A very good summary of the previous evidence produced by Grey Walter and his associates is given in Brady's article, and his experiments are based on this previous work. "It was suggested as a working hypothesis, that discriminator mechanisms employ frequency selective reverberatory nets of neurones, which, when activated, produce specific behavior patterns." A galvanic skin response was conditioned to color. If, then, photic stimuli at ascending frequencies were given, galvanic skin responses appeared at harmonic intervals and were associated with the evocation of color illusions. This supported, in the opinion of the author, the hypothesis of selective frequency networks reverberating within the cerebral cortex.

Short (123) has related the alpha index, or amount of alpha activity, to the subjects' dominant visual or auditory system. When the EEG's of a group of subjects were studied simultaneously with their respiration movements, its was found that they responded to the mental execution of certain tasks by either "seeing" or "talking" the problem, and these two characteristics were considered as indicative of visual or auditory thinking. It was found that visualists breathed regularly and showed frequent blocking of alpha rhythm, but that verbalists breathed irregularly with alpha persistence during their problem solution.

Investigation of cortical patterning as related to specific psychological tests has proven of value. Bennett (9) has examined the relationship between the EEG and certain Rorschach categories and reports significant correlation. His group was divided into those having a high alpha index and those having a low score, the division being made into exact halves of the total group. Possibly examination of a lowest and highest alpha index group, rather than a comparison of halves, might have produced an even more significant relationship. Relatively low alpha activity was found to be related to total response and suggests a difference in thinking patterns. Of most interest is the fact that those individuals with low alpha activity appear, from Rorschach testing, to have more interest in "objects and events not of interest to ordinary people." This has some relationship to anxiety.

Using a frequency analyzer, significant differences in EEG patterns have been obtained as related to three clinical groups (66): 1) patients in a mental hospital; 2) inmates of a penal institution; and 3) "normal" controls. Standard deviations of EEG rates were calculated for the three groups and were found to have valid differences, that of the schizophrenic group having greatest variability. In this respect, therefore, as in many others, homeostasis of the schizophrenic is less complete Rorschach analysis of these three groups showed strong positive correlation between anxiety, irrespective of the source of the subject, and fast, irregular wave forms in the EEG.

McAdam and Orme (84) have analyzed the characteristics of a group of patients as related to EEG patterns. Although these were alcoholics, it is stated that this group "did not present any typical personality picture of the alcoholic but rather indicated that apart from their drinking and its effects, alcoholics have little in common." A dichotomy of personality traits was obtained, as appraised by a psychiatric interview and by a "Ranking Rorschach test". This appeared to be related to the EEG tracing as a whole and not to any one fre-

quency index. A group of qualities suggesting extraversion was related to predominant alpha frequency. These findings are in agreement with those discussed earlier in relation to the psychopath. It has also been noted (63) that total EEG pattern rather than any one frequency index is that which is altered in various psychological conditions.

Finally, in reviewing the correlation of psychological and electroencephalographic data, the publications of two groups should be cited as most productive, those of Malmo and Shagass in Montreal, and those of Ulett and his associates in St. Louis.

Malmo and Shagass (87, 88) have examined the physical manifestations of anxiety and stress as measured in the somatic musculature and the EEG. The effects on muscular tension of psychiatric interviews have been found to be specific for specific clinical types (88, 122). Neurotic conditions were shown to be related to disorders of motor control such that, under stressful conditions, there was an abnormally increased motor disturbance (87). Since anxiety is known to be related to muscular tension and since it is suspected that anxiety is related to fast activity in the EEG, some interrelationship is possible here. Later Shagass (120) has used the EEG changes which appear at the onset of amytal anesthesia as an objective, quantitative estimate of degree of tension in psychiatric patients. The point at which a specific EEG change appeared under amytal, which usually correlated with the point at which speech became blurred, had high correlation with clinical rating of degree of tension in a group of 69 patients. It was low, however, in schizophrenics as compared with neurotics. Shagass (121) also has examined the clinical significance of a photomyoclonic response in psychiatric patients. This response, a blinking or jerking of facial musculature as the result of photic stimulation, was examined in 411 patients and 30 controls. Incidence of response was not significantly related to type of psychiatric disturbance, but was related to abnormality in resting EEG and to a "history of deviant cerebral excitability", including personal and familial cortical reactivity as evinced by seizures and by responses to various types of cortical stimulants such as insulin. The link between a tendency to increased muscle reactivity and increased electroencephalographic instability has been, thus, in many ways strengthened by these investigators.

Ulett and his coworkers have produced the most detailed and extensive examination of EEG qualities as compared to those of objective psychological examination (89). A frequency analyzer has been used as well as psychiatric and psychological techniques. The effort has been to establish screening techniques for various psychologically different groups. Photic stimulation has been used for activation, and other stress situations have been utilized (130, 131). Much of this material is summarized in an article published in 1953 (129). Psychiatric and psychological testing revealed that, in a group of controls, 20 of the 45 showed some evidence of maladjustment, and these were found to have an increased response to photic stimulation. The fact that rhythmic photic stimulation can, in susceptible subjects, induce subjective sensations is of interest. That, in psychiatric subjects, such sensations may take the form of previously experienced symptoms is of even greater import in our study of the relationship of cortical rhythmic activity to personality structure. Myoclonic reactions or generalized seizures were also produced in a few most susceptible individuals. Another valuable service has been provided from this laboratory in which methods for statistical evaluation and qualification have been validated (41, 132). Anxiety or anxiety-proneness has been the one psychological attribute showing strongest correlation with EEG type (132).

In their most recent article (16) these investigators dwell upon the fact that control groups are never homogeneous and that in such groups of "normals" strong correlation will appear between EEG types and Rorschach characteristics. A marked difference appeared in alpha amount between emotionally stable and emotionally unstable controls. Again, anxiety was the most strongly relating attribute.

Summary

1. During the years 1950–1955, there have been many contributions to the study of the interrelations between personality structure and electroencephalographic patterns.

2. Many new techniques have been developed in this field. In particular, the use of

stroboscopic stimulation and of frequency analysis has been of specific value. Exact clinical and psychological standards have become more widely used.

3. Elaboration of the theory of activating systems within the nervous system has provided a working hypothesis whereby correlation between these fields may be further strengthened.

4. Finally, knowledge of the interrelationship between psychological processes, as demonstrated by behavior, and the functional processes of the brain, as demonstrated by the EEG, has become more orderly and rational as a result of correlation of recent methods of psychiatric, psychological and physiological investigation.

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THE SOURCES OF JACKSONIAN NEUROLOGY

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Herbert Spencer's Principle of Evolution

Hughlings Jackson adopted Herbert Spencer's principle of evolution, of which he intended to be, though not without some caution if not timidity, a faithful interpreter. Several formulae of his principle of evolution are found in Spencer's writings, above all in his "First Principles". It was his intention, but also his nature, to develop and to expand the basic concept and its first version by a number of qualifications and amplifications, thus making the final version, it is true, somewhat involved and cumbersome. It reads as follows:

"Evolution is an integration of matter and concomitant dissolution of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite, coherent heterogeneity; and during which the retained motion undergoes a parallel transformation." (16, p. 367).

What he had in mind was no less than to trace "the entire process through which things pass" (16, p. 499)—from the imperceptible to the perceptible, and from the perceptible to the imperceptible. He did not deny that "both the emergence and immergence of the totality of sensible existences must ever remain matters of speculation only." (16, p. 256). In particular, he held the view that in the case of organisms, the account was partially based on observation, but largely based on inference; he still believed that "the account fulfilled the definition of a complete history fairly well." (16, p. 255). He referred the change implied in this history to the general law of the redistribution of matter and motion. An aggregate, he stated, may either be losing motion and integrating or gaining motion and disintegrating. Thus originated the first formula of his principle of evolution, according to which "the change from a dispersed, imperceptible state to a concentrated, perceptible state, is an integration of matter and concomitant dissipation of motion; and the change from a concentrated, perceptible state to a dispersed, imperceptible state, is an absorption of motion and concomitant disintegration of matter" (16, p. 257). It is significant that from the outset Spencer's principle of evolution conveyed the concept and the term of *integration*, which gained an over-all importance in neurology, due to Jackson and the course taken by neurology after him. So strong and almost exclusive was the role assigned by Spencer to integration in the evolutionary process that on his road to the final formula he seemed satisfied with the following expression:

"Evolution under its most general aspects is the integration of matter and concomitant dissipation of motion; while dissolution is the absorption of motion and concomitant disintegration of matter" (16, p. 261).

But in Spencer's terminology the term integration still conveyed a purely physical meaning. This was only logical and unavoidable in a system of which the only constituents were matter, motion, and force. It has hardly been realized as yet that hereby Spencer proved to be a latecomer to the Eleatic Sect, more specifically, to the teaching of *Democritus* who, rejecting all metaphysical explanations of the causes of things, undertook to interpret nature by the laws of matter and motion—this teaching finally merging into *Epicurean* philosophy. Here were the roots of one of the three ancient schools of medical thought, i.e., that of the *Methodist Sect*, of which the founder was *Asclepiades*. We may now understand better that Spencer used the term integration as synonymous with others, which are unmistakably physical, if not mechanical in nature; here are some of the synonyma: integration, condensation, concentration, consolidation, combination, unification, coherence, aggregation.

So strong was Spencer's tendency to interpret all natural phenomena in terms of matter, motion, and forces that he traced back such processes as recovery, the *vis medicatrix naturae* and *adaptation* to a simple "balancing of mechanical forces" (16, pp. 459, 461). For centuries, however, the physician's belief and trust in the spontaneity and artistic skill of nature seemed embodied in the healing power of nature.

But integration of matter (and concomitant dissipation of motion) was only one aspect of evolution, though its most fundamental one. Evolution was also defined by Spencer as a change from a less coherent form to a more coherent one, consequent on the dissipation of motion and integration of matter. A further qualification was that from a homogeneous state to a heterogeneous state and finally that from the indefinite to the definite. These additional clauses are implied in the final formula cited in the beginning of this paper.

There remained, however, one element of Spencer's principle of evolution which was not mechanical in nature and which must be conceived as a true constituent of a living organism, i.e., the *interdependence* of its parts. From the lowest living forms upwards, Spencer said (16, p. 300), the degree of development is marked by the degree in which the several parts constitute a cooperative assemblage—are integrated into a group of organs that live for and by one another. Here, for the first time, the term integration assumed a meaning no longer supported by any of the physical devices or processes implied in the synonyma used, though Spencer still believed that this mutual dependence is "dimly foreshadowed" among inorganic existences, both celestial and terrestrial. In fact, he had reached the limits of physics and was about to invade metaphysics though he was very far from having even the slightest inclination for the latter.

Jackson's Principle of Evolution

Jackson adopted Spencer's principle of evolution with the intention of tracing the evolutionary hierarchy of the nervous centers. But he did not adopt the principle in the very same terms as used by Spencer. He used terms, he confessed, more familiar to medical men than those Spencer used. Illustrating by *movements*, he said that there is from lowest to highest centers: 1) increasing complexity (differentiation), representation of a greater number of *different* movements; 2) increasing definiteness (specialization), representation of movements for more particular duties; 3) increasing integration, representation of movements of wider ranges of the body in each part of the centers; 4) the higher the centers, the more numerous the interconnections of their units (cooperation). There was implied in this formula of evolution Jackson's doctrine of cerebral localization which was a strictly functional or physiological rather than anatomical one, movements but neither parts of the body nor muscles being represented in the brain. Of all Spencerian terms retained by Jackson, again that of *integration* was given the greatest importance—"ignored by the current doctrine," he added (5, II, p. 80). Slightly modifying the terms and trying to reach a still more universal concept, he said that evolution is a passage from the most to the least organized, from the most simple to the most complex, and from the most automatic to the most voluntary (5, II, p. 46). Dissolution was understood to be the reverse of the process of evolution; dissolution, he qualified, can be uniform and local. There is, however, to be found in Jackson's scheme of evolution a concept which, rightly understood, adds a most significant modification and qualification to too rapid an interpretation of the evolutionary process as the broken or unbroken passage from one level to another *entirely different* one. The concept is that of the *unit of constitution*. By this term Jackson did not mean a unit of composition—consisting of an arrangement of different fibers, ganglion cells, efferent fibers, etc.—but a unit containing these in such balance of relations that they serve harmoniously in complete actions (5, II, p. 234). He believed this unit of constitution to be the same at all levels. It was logical that he finally reached the conclusion (expressed in a footnote as were so many of his far reaching statements) "the whole of the nervous system and its parts are developed on the same fundamental plan" (5, II, p. 237 n). Here may be sources, unexplored so far, of Jackson's disbelief in cerebral maps. Indeed, a uniform system offers no opportunity for regional localization; that is, for conclusions one may be tempted to draw from structural differences to justify functional ones. But above all, with his own assumption of an identical fundamental plan at all levels of the nervous system, Jackson had joined the evolutionists of the early nineteenth century and reached Goethe's doctrine of metamorphosis.

Functional Metamorphosis

Here is the principle of Goethe's metamorphosis as outlined by this writer in a previous paper offered to the medical historian as a

tribute on the occasion of the bicentenary of Goethe's birth (1949):

> All perfectly organized beings are formed according to a basic type, the "archetype." Finished structures are but modifications and variations of this archetype, and we must look at the infinite number of species and individuals as at *steps or stages in a state of permanent becoming*. Giving up his search for the archetype in nature, Goethe finally conceived of it no longer as a perceptible reality but as an *idea*. He also conceived the links we establish between the endless variations of organized beings as ideal links, bridges for unification and synthesis. The archetype does not exist *as such*, we only see its manifold *versions*: this is the true meaning of *metamorphosis*. What is identical in design and idea, may assume in life identical or similar, but also entirely different forms: this is what Goethe called the *dynamics of nature* (10, pp. 546, 547).
>
> Hughlings Jackson occasionally quoted K. E. von Baer and also Goethe, but he never referred to the doctrine of metamorphosis . . . We read in Spencer's *Factors of Organic Evolution* that in all cases the homogeneous tends to pass into the heterogeneous, and the less heterogeneous into the more heterogeneous. The step with which evolution commenced must have been the passage from a state of complete likeness to a state in which there existed some unlikeness (15, pp. 71–72). It is a fundamental element in Goethe's metamorphosis that evolution leads to a greater definiteness of the parts, to a lack of likeness and symmetry or, briefly, to greater differentiation. The latter term became the keynote in Jackson's principle of evolution. Jackson conceived the nervous system as composed of different levels. While it is true that he established a hierarchy of levels, leading from the lowest, the spinal, to the highest, the frontal levels, he nevertheless believed each level to be the same unit of constitution serving the same function, namely coordination. All nervous centers, he said, are centers of coordinating impressions and movements; different only in the kind of impressions and movements they coordinate and in the degree of complexity to which coordination is carried (5, I, p. 49 n). The whole of the nervous system and its parts are developed on the same fundamental plan (5, II, p. 237 and II, p. 413). Here then we have an archetype of the nervous system undergoing, it is true, modification, but never denying the basic plan. This idea is also embodied in the statement that the higher centers are evolved out of the lower ones. A higher center is an inferior center "over again" and "raised to a higher power" (5, I, p. 172). The terms "recapitulation" and "recommencement", he used for this evolution, expressed in an unmisunderstandable manner the idea of a basic type rediscovered, though complicated at any step and stage of this metamorphosis of nervous structure and nervous function. (10, p. 552).

There remains, however, that fundamental difference between Goethe's metamorphosis and Jackson's principle of evolution that—at least in Goethe's mature thought—the archetype remained an *idea* whereas Jackson's "unit of constitution" was understood to exist as a *concrete reality* in nature. Through his purely intellectual view of the archetype Goethe, though unwittingly and certainly unwillingly, shifted the problem of evolution from natural history to logic (if not metaphysics), thereby reviving the teaching of Aristotle. The philosopher indeed, though agreeing that in order of *time* the material and the generative process must necessarily be anterior to the being that is generated, nevertheless maintained that in *logical* order the definitive character and form of each being precede the material (1, II, p. 1). This statement is intelligible only by conceiving the "definitive character and form" as the structural plan, the vital program or the organic model, in brief, as the archetype which determines and directs the generation though this originating cause has only logical existence, that is only in man's mind and interpreting power.

Epigenesis Versus Preformation

It seems tempting, if not imperative, to analyze the Jacksonian principle of evolution in the light of the great theories of generation conceived by human intelligence since the days of the Greeks. In Galen's (3) thought, the evolutionary history of the individual was closely linked with his doctrine of the "Natural Faculties". True, he admitted and treated in detail as major faculties only "the one attracting what is proper to it, another rejecting what is foreign, and yet another causing alteration and adhesion of the matter destined to nourish," but he occasionally distinguished "a faculty, which we call the shaping or formative faculty." He called it an *artistic* one—"doing everything for some purpose, so that there is nothing ineffective or superfluous, or capable of being better disposed." This was truly Galenic and the spirit of one of his major works: *De Usu Partium;* but it was also the spirit of Aristotle's *De Anima*. True, Galen also realized that "it is not the province of what comes secondarily, but of what pre-exists, to shape and to construct"; but he did not identify this order as a *logical* one, herein remaining behind the Stagirite, substituting ontological for logical principles and professing views to be known and condemned much later as *vitalistic* or *animistic*. In fact, the critical passage in

Galen's "Natural Faculties" contained a strong polemic element directed against Erasistratus and the "perfect nonsense" of "every hypothesis of *channels* as an explanation of natural functioning" (3, p. 127); but also against "inharmonious and indivisible elements", none of these, he said, containing within itself any formative, incremental, nutritive, or, in a word, any artistic power; it is by hypothesis, he concluded, unimpressionable and untransformable, whereas none of the processes mentioned takes place without transformation, alteration, and complete intermixture (3, p. 159).

The Aristotelian and Galenic interpretations of generation and evolution never died out in the history of human thought. They were revived many centuries later by William Harvey. Independently of each other, two contemporary medical historians testified to the Aristotelian heritage in Harvey's *De Generatione*. We read that "Harvey established the immateriality of the vital principle in the sense of Aristotle, against the crude materialistic and pseudoidealistic ("animistic") theories of his time" (7, p. 149). We also were reminded that Harvey "whose mind and outlook were formed at Padua. . showed himself in *De Generatione* both as biologist and as metaphysician" (6, p. 5). This writer reached similar conclusions when discussing and analyzing in an educational paper (12, 13) the impact of *reasoning* and preconceived ideas in Harvey's discovery of the circulation of the blood, the purely *experimental* aspect of which has been frequently overstressed.

Finally, in a little known passage of his posthumous *Principes de Médecine Expérimentale*, Claude Bernard enunciated, though in a rather sketchy manner, his principle of evolution. In organic evolution, he said (2, p. 143), nature proceeds by differentiation of an original type; no doubt, an organized being is derived from an original cell, the ovum; but still more important is to observe the fact, that from this cell, this organic mould there spring through successive differentiations, individuals which continue to multiply, and to undergo increasing differentiation, in proportion as they come to be remote from the origin. Is it not significant that the nineteenth century founder of the experimental method left room for an "original type" from which the individuals spring in the same way as particular cases are referred to a law? The conclusion has a still greater significance in the light of Claude Bernard's constantly expressed striving for an interpretation of all vital phenomena on the sole grounds of physics and chemistry — grounds from which, as he felt, "vital principles" have to be banned forever.

In the final analysis, all theories of generation, countless as they might appear to the annalist of science, can be reduced to two basic types, both of them emerging in the eighteenth century. According to the theory of *preformation* (or *evolution* in the narrow sense), the germs of all men, animals, and plants, past and future, were created from the very onset, evolution consisting in no more than an *unfolding* of succeeding generations. According to Heraclit and Hippocrates, these germs are spread all over the earth until they encounter the genitals of finished individuals of their kind, settle down, cast off their envelopes, and begin to develop. This phantastic design became known as the doctrine of *panspermia*, though the term has come to be used for the theory of the omnipresence of disease germs. More intelligible appeared two other theories of evolution, according to which the germs were not vagrant, but pre-formed, nested into each other, and dormant in our original parents, be it as the spermatic animalcules of the male, be it in the ovaries of the mother. In other words, the whole human race pre-existed in the genitals of our first parents in the shape of previously-formed germs which become evolved in succession; one can hardly forego the conclusion, drawn indeed by Blumenbach, one of the most eminent critics of this doctrine, that according to the latter pure generation never occurred.

There remains the last theory of generation, known as *epigenesis*, supposing not an evolution of fictitious germina by conception, but a true generation and gradual formation of a new conception from the hitherto formless genital matter. This doctrine was enunciated and reformulated by a number of authors under different names, from the *vis plastica* of the ancients to the *vis essentialis* of C. F. Wolff, and finally to the *nisus formativus* of F. Blumenbach. According to the latter, the nisus formativus gradually *forms* organs fitted for particular purposes; preserves this struc-

ture during life by nourishing the body; and reproduces as far as it can any part accidentally mutilated. The truly *organogenetic* nature of this principle of generation and evolution will not escape the reader; nor can it be overlooked that here the principle of *generation* was identified with the principles of *growth* and *regeneration*.

Is it possible to identify Jackson's principle of evolution with any of the theories just mentioned? As a rule, a physician, unless he is an embryologist, will hardly focus his thought on theories of generation. But each disease can be considered to be an evolutionary history, the symptoms being the milestones, and marking the stages of this history. The problems of evolution and generation then recur in the guise of the genesis of symptoms. Jackson distinguished the negative element in symptomatology from its positive one. The former was understood to be "the dissolution, and answers directly to loss of so much" (5, II, p. 15), whereas the positive element was physically "activity of lower nervous arrangements, which are, except for over-activity, healthy" (5, II, p. 16). Obviously, the problem of the genesis of symptoms can only be raised in reference to the positive symptoms which are true new-formations (such as tremor, hallucination, etc.), whereas the negative symptoms (such as paralysis, speechlessness, etc.) are mere deficiencies resulting from destruction. The positive aspect in symptomatology conveys an unmistakable epigenetic element. Jackson called it the "survival of the fittest." It is most significant that Jackson, who declared more than once that evolutionism is not synonymous with Darwinism, borrowed from the latter no more than just this term, which is *teleological*, and therefore strangely contrasts with the *accidental* occurrence of individual variations from which ultimately Darwin derived the origin of species. Through this teleological term Darwinism obtained at the same time an epigenetic constituent, indeed a small, but nevertheless unmistakable and far reaching one; this teleological undercurrent in Darwinism was uncovered by one of this writer's early and great teachers, Oscar Hertwig (4). In Jacksonian neurology the "survival of the fittest" is understood to be the resultant of two factors: 1) of permitted activity of what is already organized in what is left of the patient; and 2) the influence of external things, or peripheral conditions interfering with, modifying, the activity of that already organized (5, II, p. 23). Atrophy of the brain, Jackson said, is no more the cause of illusions than softening of the brain in the case of an aphasic is the cause of his wrong utterances (5, II, p. 24). Evidently, both the illusions and the wrong utterances are the survival of the then fittest states during activity of what are the highest arrangements at the time.

Moreover, every physician faces the problems implied in recovery and restitution. I am unable to discover in Jackson's interpretation of restitutional processes any epigenetic element. To him, recovery was simply the continuation of the activity of the spared parts. Loss of movements, resulting not from "impairment of function" of part of a motor center, but from permanent annihilation of part of it, is largely compensated in time by greater activity of the remaining terms. Compensation, thus defined by Jackson, does not mean that nervous arrangements take on duties they never had before, but that, having more or less closely similar duties, they serve—not as well, but only—next as well as those destroyed (5, II, p. 36). This scheme was the logical result of Jackson's view of cerebral localization, according to which the hypothetical centers do not represent muscles but movements or muscles which have yielded their individuality into different movements or "terms" (5, II, p. 31). On destruction of one or more terms, the other terms remain.

Jackson made no appeal to plastic or organogenetic factors—as C. von Monakow did many years later—when he used the concept and the term of *post-generation* to indicate the productive factor implied in repair and restitution; Monakow ascribed them to his "horme", that instinctive and formative principle believed by him to be the driving force of the organism's genesis, growth, and welfare. There is no doubt that C. von Monakow in conceiving the idea of his horme passed from physics to metaphysics, and we have reason to believe that Jackson did not remain unimpressed by Spencer's disbelief in the usefulness of metaphysics in natural history.

We are now prepared to answer the question whether or not there are also to be found in Jackson's view of evolution preformationist

elements. Should the lower and spared levels which continue their activities in dissolution, as the survivals of the then fittest states, be conceived as mechanisms or behavior patterns related to fixed structures and pre-existing as such in the history of the organism, the fundamentals of the theory of pre-formation could not indeed be denied to Jacksonian neurology. But, as this writer recalled on a previous occasion (8), these mechanisms far from existing in previously fixed and finished forms continue to undergo in disease evolutions of their own, thus preventing dissolution from being the exact opposite or reverse of evolution. Here was left open an opportunity for admitting of truly *organizing* activities, an opportunity which, strangely enough, Jackson did not seize though he claimed the surviving activities as the fittest ones, and though he did admit of the organism's *adjustment* to the environment (5, II, p. 13).

Sensualistic Sources

(*An unexplored area in Jackson's doctrine of aphasia*)

There is implied in Jackson's doctrine of aphasia his thesis of a double revival of words in speech, first, an automatic revival on the right succeeded by a voluntary revival on the left side of the brain. Concepts, images, perceptions develop words automatically in no order or rather in their own order, on the right side of the brain. Words are, or may be, objectively considered on the left—put into relations—made into propositions (5, II, p. 228). Discussing paraphasia and calling subject-proposition the "survival of the fittest" words in fittest relation during activity beginning in the right half of the brain (5, II, p. 187), Jackson went so far as to suppose, roughly speaking, that the words of the subject-proposition "come over" to the left side prematurely (5, II, p. 194). It seems that his thesis of the "duality" of the brain sprang from the observation that it is possible to rouse words in a man who has lost the side of *voluntary* revival of words by disease; the legitimacy of this conclusion, which one is tempted to draw from the observation cited, may, however, be questioned. Indeed, what a man does after his brain has been damaged is not necessarily what he did prior to the injury. Moreover, the concluions carries a remainder of the cerebral localization of functions for which Jackson, for the first time in the history of neurology, tried successfully to substitute the cerebral localization of *symptoms* or *lesions. How was it possible*, one may ask, *that Jackson fell back to a medical thought which he himself strove so hard to uproot? The answer*, I think, *is implied in his belief in perceptions or images as the ultimate sources of "general notions."* This, of course, was sensualistic thought and tradition. He took the word triangle as an illustration. "The three interior angles of every triangle are equal to two right angles. I cannot but think that everyone who heard and understood this statement would have a perception of a drawing of that kind of triangle which had, in his experience, been most frequently associated with the word triangle, or some triangular figure which had struck him" (5, II, p. 229 n).

He also took other illustrations, always trying to show that perceptions of particular objects ultimately come to stand for the same object in *general*. Similarly, he interpreted pantomimic actions by the principle that "some parts of operations come to stand for the whole operations" (5, II, p. 208). The principle implied a factor in evolution, little understood and hardly mentioned so far, namely the factor of "detachment" (5, II, p. 209). Actions thus originating are *symbolic* so far as they are not mere repetitions of the former actions, but incomplete and modified reproductions of them (5, II, p. 209). This marked, according to Jackson, the birthhour of reasoning in the history of human thought.

But I submit that *no particular object and no particular figure can ever serve as general notions of this object or this figure*. The generality of a notion cannot be reached by any particular image, which by its very nature of being a *particular* object precisely fails to serve its purpose for which it is called, namely to develop with each name an image of each kind of object or figure (5, II, p. 211). To reach the "general notions" of things, we must indeed leave the sphere of perceptions and images; this means we must also leave the sphere of the brain and its perceptible processes. It remains doubtful that contemporary neurologists are willing to accept this conclusion marking the *limits* rather than the *resources* of brain research. But the conclusion nevertheless is

inescapable, should we really want to reach that kind of a "general notion" of an object which includes all particular objects ever conceivable of the same kind. It seems only too clear that this kind of "general notion" would no longer be an image (but the *concept*) of the objects. But how to define it?

The reader familiar with the basic epistemological problem involved will list it as a sign of Jackson's remarkable insight that he used such terms as "spectre", "shadowy vision", or "lay figure" of an object. With these terms he had reached the knowledge and the meaning of the *schema*, an idea which ranks very high in the theory of knowledge, especially in Kant's *Critique of Pure Reason*. The terms cited helped him "to translate my single permanent perception of a horse into the perception of any particular horse I remember" (5, II, p. 231).

There was indeed implied in the terms "translate" and "lay figure" the *very general* nature of these "shadowy visions", on the one hand, their usefulness for serving in recollection and identification of *particular* objects, on the other. But there was still Jackson's recurrent theme "that we have ever present in the nervous system an organized form which, when revived, is a shadowy vision of some horse. . ." Thus, the door was left open to some kind of centers though these were no longer conceived as deposits of images but only as "spectres", "shadowy visions", or "lay figures". The task remained to uproot these last vestiges of the famous doctrine of cerebral centers which even Jackson's brilliant mind could not shake off entirely. Should we have gained the knowledge that images or perceptions cannot be considered as the ultimate sources of "general notions", the automatic rise of words from perceptions and their automatic revival on the right half of the brain, their voluntary revival on the left, in brief, the thesis of the duality of the brain, would become precarious. At the same time the role of the brain in speech, and one should like to add, at large, would have to be reformulated.

We approach the solution of the problem involved in Jackson's "general notions" and their presumable cerebral representations by recalling that the schema itself is not the "general notion" as yet; let us remember that the difficulties precisely arose from the definition of the "general notions" of objects and the thesis of the doubleness of mental processes which Jackson borrowed from Laycock, Spencer, Carpenter, and Lockhart Clarke. Each of these double processes was believed by Jackson to take place separately in one of the two halves of the brain, the automatic one in the right, and the voluntary one in the left hemisphere. The "general notion" of an object, this "ever-present modification of my organization, usually sleeping, but any time to be awakened. . ."—is it a sensory or is it a motor process, Jackson asked. "In other words is it a (potential) perception—i.e. a unit formed out of certain complex sensations . . . or is it an arbitrary (potential) motor sign in itself altogether meaningless—a counter which is revived to serve in thought *instead* of a perception. . .?" He concluded that there must be both a motor and sensory process. He understood the word to be the motor sign for a given object, and he believed the perception or the "shadowy vision" of some object to serve with the word for the same object "in rapid thought." The critical passage here quoted belongs to the most difficult, most involved and obscure ones in Jackson's entire writings. One does, however, retain that Jackson made an almost desperate attempt to interpret "general notions" in terms of motor and sensory processes, evidently with the final aim so significant of his thought and the doctrine of concomitance, to correlate general notions with the nervous system. It is true, however, that he felt compelled to reduce images to perceptive *signs* referring to no particular objects. That he used at all such terms as "signs" and "counters" (qualifying them occasionally as "arbitrary" or "meaningless" in themselves) marked the direction in which his thought was shifting from a purely physiological interpretation of thought and speech (in terms of movement and sensation) to a more psychological if not metaphysical one.

Idealistic Sources?

(*An unexplored area in Jackson's doctrine of consciousness*)

There are to be found in Jackson's thesis of the "Duality of Consciousness" far reaching statements implying a theory of experience at large and of nervous functions and disorders in particular. In the following paragraph the

thesis is rendered in the very same terms in which Jackson offered it, almost seventy years ago, to the learned readers of the "Medical Press and Circular".

It is impossible to speak of objective states without implying subject consciousness, he said. In every proposition subject and object consciousness are indicated. Though subject consciousness is symbolized by "I", and object consciousness by an object, "I" covers both subject and object consciousness. It stands for a person. Some expressions in popular psychology give the duality very decidedly, Jackson said. There is the statement "ideas come into consciousness". This, he felt, is a most explicit acknowledgment of the duality. But according to Jackson, it should be "ideas come out of subject consciousness and then constitute object consciousness." All states of object consciousness "come out of" subject consciousness. In another passage Jackson spoke of images as "forced out of" subject consciousness, reminding the reader of early theories of vision. It was not meant "come out of" in the sense of being entirely detached from. Objective states quite detached from subject consciousness would be mental states of nobody's having. The latter sentence implied a theory of experience.

The expression "double consciousness" may suggest, he agreed, two separate, independent, similar consciousnesses (two juxtaposed singles), in spite of the remark on subject and object consciousness that "each is only half itself." It is misleading in other ways, he added, two different states of object consciousness often enough co-exist for one subject. This having two distinct objective states is quite a different kind of "double consciousness" from that which is meant when subject and object consciousness are spoken of.

What obviously was at stake, was the discriminative use of the terms objective and subjective. Jackson made repeated attempts to eliminate the confusion, frequently resulting from an ambiguous use of the two terms. It is most revealing that he used them both as *psychical* terms. The term "subjective" answers to what is physically the effect of the environment on the organism; the term "objective" to what is physically the reacting of the organism on the environment. The terms are used for what are on the physical side, the two conditions of the organism in its correspondence with the environment (5, I, p. 310). Jackson was particularly anxious to eliminate the alternate use of the two terms for the conventional distinction between thinking of an object (ideation) and seeing it (perception). An idea, he said, is only a faint external perception (percept), and an external perception is only a vivid idea. This difference of mere degrees, he concluded, sinks into insignificance before that difference implied by the rhythm of subject and object consciousness, and illustrated by the unconscious and automatic reproduction of images of objects before that perception which is a conscious and voluntary reproduction of them (5, II, p. 94). The student of Jackson's writings will recall that the eminent clinician tried by a similar method to abolish the distinction between external and internal speech, reducing the apparently basic difference between them to a difference of degree (14). Here and elsewhere he made use of the term "nascent movements" (or "nascent excitations of nervous arrangements") which, much later, gained their well-known importance in the work of Henri Bergson and his interpretation of thought as action.

It seems to this writer that Jackson here left Spencer far behind. Spencer considered object and subject or *self* and *not-self* to be "manifestations of the Unknowable," each order of manifestations carrying with it the irresistible implication of some power that manifests itself; and by the word *ego* and *non-ego*, respectively, he meant the power that manifests itself in the faint forms, and the power that manifests itself in the vivid forms (16, pp. 137, 138). There was implied in these statements an unmistakable and explicit tendency to consider the two orders of manifestations as "substantially self-separated and self-consolidated." Though it remains true, as Spencer said, that "a unit of feeling has nothing in common with a unit of motion" (17, I, p. 158), it remains equally true that both feeling and motion refer to the same unity of consciousness. Jackson indeed referred both the subjective and the objective to "mental action" which he declared to be a "rhythm of subjective and objective states." While Spencer tended toward an isolation and objectivisation of subject and object, Jackson was driven to include the objective into the subjective, thus approaching Kant's reversal of

the thinking method (*Umkehrung der Denkungsart*), from which Spencer dissented though his "transfigured realism" was perhaps not too far from Kant's "transcendental idealism." The subject is a most difficult one, and the reader might not be prepared to learn that the study of the principles and the sources of Jacksonian neurology will inevitably carry him far into the theory of knowledge.

The whole passage on the Duality of Consciousness, obviously written under the influence of Spencer, most likely refers to a passage in Spencer's *Principles of Psychology* (17, II, p. 321 seq.). In the latter passage, Spencer tried to prove that the Berkeleian thesis (17, p. 326), i.e., the idealistic thesis, is untenable. Let us grant Berkeley his entire position, Spencer argued: saying with him that the only existences are in the mind and that the being of everything is being perceived. And let us imagine, Spencer continued, that his words imply nothing whatever beyond these states of mind or ideas. The analysis of a simple proposition revealed to Spencer as indispensable elements of the thought, ideas or clusters of ideas referring to different existences beyond consciousness. Words, Spencer concluded (17, II, p. 335), if used with all the intrinsic and extrinsic connotations they have acquired, separately and jointly, imply existence beyond consciousness. *Did Jackson allow idealism to reach a greater scope in his own design of nervous function than it actually had in Spencer's thought?* In my "Hughlings Jackson's Doctrine of Consciousness" (14a), I indeed reached the conclusion that the critical passage—"objective states quite detached from subject consciousness would be mental states of nobody's having"—implied the statement (not made by Jackson) that a world existing outside our own consciousness would be non-existent *to us*. It seems indicated to amplify the statement by adding that the writer's passage, quoted above, did not imply the conclusion that a world existing outside our own consciousness would be non-existent *at all*. I attributed to Jackson no more than the tendency to conceive man's world and experiences as *shaped* by man's consciousness, but not as *existing* solely in it. In the light of this view human mind remains, it is true, origin and center from which springs our world though not as to *constituent matter*, but only as to *form* or *laws* reigning in this world and making it an intelligible, predictable, and thus habitable one. Jackson was far from denying the reality of our world, and from conceiving a theory of experience in which there would be no room for experience. His thought and his tradition were too deeply rooted in the teaching of his great countryman, John Locke, to allow him to follow the path, shining as it may appear, to a daring and noble mind, of his other great countryman, George Berkeley.

Epilogue

One finally may raise the question whether or not the Spencerian and the Jacksonian principles are still truly evolutionary ones. Should one understand evolution to be *history* or a state of becoming *in time*—the species or the individual passing through different stages, to grow, to mature, and finally to decline—the principle of evolution as enunciated by Spencer and adopted by Jackson hardly deserves the name. Spencer only very occasionally referred to the *chronological* aspect of evolution leading to "modifications upon modifications accumulated during an immeasurable past" (17, I, p. 291). Jackson never intended to write the natural history of man; nor did he write the natural history of brain injuries and brain diseases. It was left to C. von Monakow to divide this history into the two great chapters of initial and residual symptoms, the former being more severe but, as a rule, transient and due to cerebral shock or diaschisis. But H. Jackson did introduce into regional diagnoses the *momentum* of brain lesions or the rapidity with which they develop as a chronological factor most important for the genesis of symptoms (9).

The passage from homogeneity to heterogeneity or that from the general or indefinite to the special or definite remains a passage from one mode of *thinking* to another, but not that from one perceptible reality to another. It is the classification and, above all, the *interpretation* of natural phenomena, which are here at stake, but not the observation of their successive perceptible stages in purely *descriptive* terms. Spencer himself was led to admit (16, p. 255) that the account of the history of organisms remained "partially based on observation but largely based on inference."

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PSYCHOLOGICAL FUNCTIONING OF AGED INDIVIDUALS WITH NORMAL AND ABNORMAL ELECTROENCEPHALOGRAMS[1]

I. A Study of Non-Hospitalized Community Volunteers

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In 1950 our group began a study of the psychological, physiological and social aspects of human aging. Much of our original work was centered around the determination of EEG patterns in various groups of individuals of 60 years of age and over. Our first report (1) concerned the EEG patterns observed in a group of 75 elderly individuals who were still functioning in the community, i.e., non-hospitalized individuals, without apparent neurological or psychiatric disease. We referred to this as our "Community Group" and reported on the relatively high incidence of temporal EEG foci, particularly left anterior temporal. This preliminary report was elaborated on, with the series increased to 113 elderly individuals, in 1953 (2). At the time of that report there appeared to be no correlation between the left-sided lateralization of the foci and cortical dominance as measured by handedness. While generalized vascular pathology did appear to be somewhat more common in people whose records showed diffuse disturbances in rate as compared with those having normal EEG's, this did not appear to be true for the focal group. In 1955 we presented our findings on the EEG patterns of 145 community volunteers, and 110 hospitalized "senile" patients, all 60 years of age or over (11). At that time we again noted the high incidence of temporal foci, particularly left anterior temporal. This study indicated that the distribution of normal, focal and diffuse records varied considerably with the socio-economic group being studied.

Since the publication of this last report, our interest in EEG patterns of elderly people has continued as part of a broader, multi-discipline study of the human aging process. This report will present a breakdown of the EEG patterns observed in 223 elderly volunteers, who were functioning in their community at the time of their examination and who are without known psychiatric or neurological illness. In particular we wish to report on psychological functioning as it relates to EEG grouping for this group of elderly individuals.

[1] This study was supported by a research grant from the National Institute of Mental Health of the National Institutes of Health, United States Public Health Service.

Read at the American EEG Society, Atlantic City, New Jersey, June 15, 1956.

TECHNIQUE

The individuals dealt with in this report all represent volunteers of the age of 60 or above (the average age of the entire EEG group of 223 is 72.2 years). Their routine work-ups included social, medical and psychiatric histories, physical and neurological examinations, various laboratory determinations (C.B.C., N.P.N., blood sugar, serology, etc.), and certain psychological test procedures. Patients presenting illness found to affect central nervous system functioning significantly were not included in this series.

Electroencephalograms. Routine records were made on 8-channel, model III Grass instruments, using both monopolar and bipolar techniques.The vertex was also used routinely as a reference point. Three minutes of hyperventilation was standard. Average records were 20 minutes' duration although frequently longer periods were needed. Sleep records were frequently obtained, but a report of these will not be included here.

Interpretation of records. Records were read using standards of *adults below the age of 40.* Essentially our classification system has been that of Gibbs, using the dominant rhythm of 8 to 12 cycles per second with no significant slow or fast activity as NORMAL. Predominantly LOW VOLTAGE FAST records with fast activity below 15 microvolts were also considered within normal limits. S-1 or F-1 was the classification for slightly abnormal

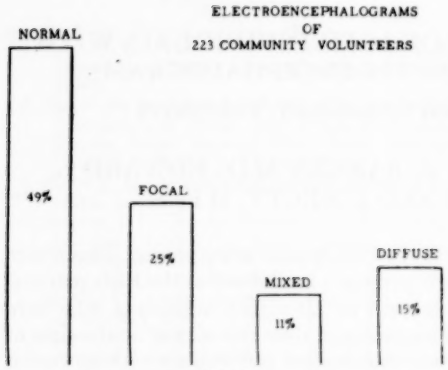


FIG. 1

slow or fast records, and S-2 or F-2 markedly abnormal slow or fast. The categories FOCAL S-1 and FOCAL S-2 were also used and follow the conventional definition. FOCAL ASYMMETRY refers to an unusual difference in amplitude or pattern, or both, between the homologous cortical areas, each of which, when considered alone, would not be thought abnormal.

Psychological testing. In order to determine whether the presence of EEG abnormality was associated with evidence of psychological changes within the subjects, each person was administered the Wechsler Intelligence Scale and the Rorschach Psychodiagnostic Ink-Blot Test. The 66 subjects from the Denver, Colorado, population received the Wechsler-Bellevue Intelligence Test while the 87 Durham, North Carolina, subjects received the more recently available Wechsler-Adult Intelligence Scale. Both tests were administered in accordance with the instructions in the manual. (It should be noted that a total of 223 individuals are reported in the EEG studies. Of these, 153 were available for psychological testing.)

The Rorschach was administered to all subjects, but for the present study only the scores of the 87 Durham subjects are reported. The test results will be reported in terms of scores on the Fisher Maladjustment Scale. The Rorschach was administered in the manner prescribed by Beck with one important exception. The Inquiry was administered immediately after the performance proper on each card instead of waiting until the end of the test because pilot work had indicated that it would be difficult to obtain scorable records otherwise. The Fisher Maladjustment Scale (4) is a method of evaluating the Rorschach by means of assigning weighted scores for various usually accepted Rorschach signs of maladjustment, e.g., absence of color response, and has successfully differentiated normals, neurotics and psychotics and high and low scores on a social attainment scale.

RESULTS

Electroencephalograms. Figure 1 brings up-to-date our EEG findings in elderly people. Essentially they are as reported in our previous studies (1, 2, 11). The category *diffuse* refers to generalized fast, slow or combined fast and slow records. The *mixed* group is made up of records presenting both diffuse and focal disturbances.

Figure 2 illustrates the breakdown of the 55 pure *focal records*, 54 of which were temporal foci, the one other being right parietal. Of the temporal foci, 42 or 78% were left temporal, the remainder being right temporal (4%) or foci presenting in both temporal areas (18%), either synchronously or independently. Of the 42 left temporal foci, 31 (74%) were either maximal in the left anterior temporal lead or seen exclusively there. The disturbances ranged in severity from focal asymmetries (fig. 3) and mild focal slowings (fig. 4) to severe focal slowings with or without focal spiking (fig. 5).

The *diffuse disturbances*, 35 in all, were made up of 13 diffusely slowed records (all within the S_1 category) and 20 diffusely fast records with 2 combined fast and slow. The *mixed disturbances* consisted of 24 records with

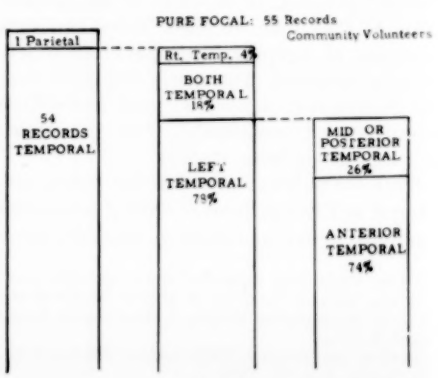
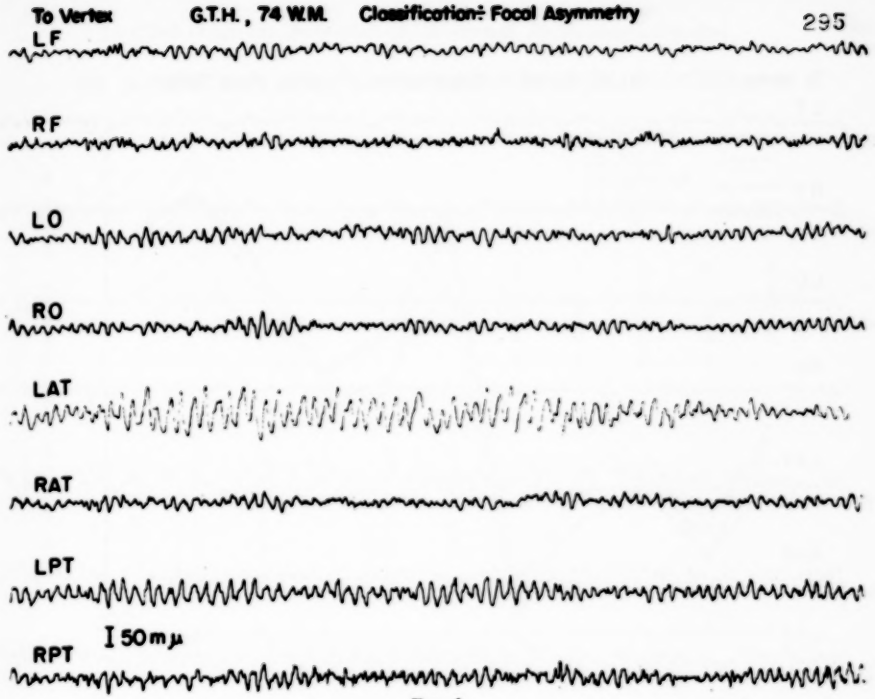


FIG. 2


To Vertex
G.T.H., 74 W.M.
Classification: Focal Asymmetry
LF
RF
LO
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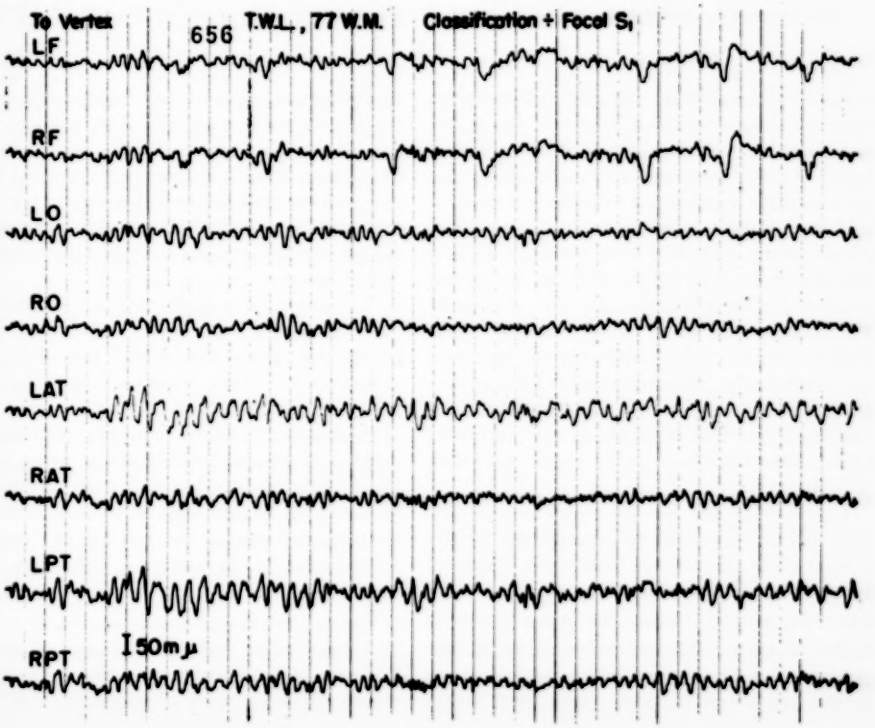
RPT
I 50 mμ

FIG. 3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656
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FIG. 4

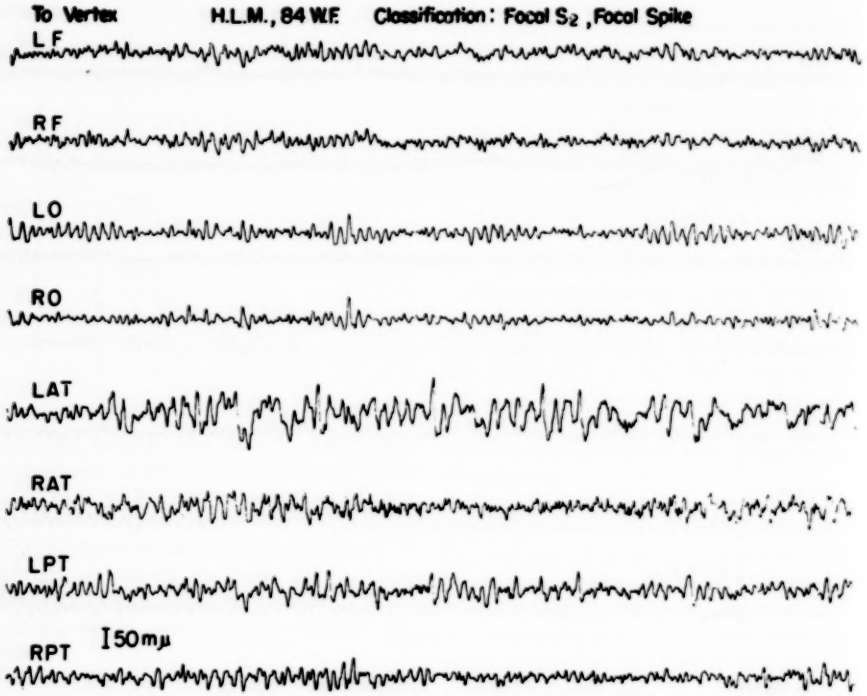

FIG. 5

mixed focal and diffuse disturbances. Twenty-three of these contained temporal focal disturbances, with one an occipital disturbance. Again the left temporal and particularly the left anterior temporal predominance is seen.

If we combine our focal records from the mixed group with the pure focal group, we find that a total of 79, or 35%, of the entire group of 223 records demonstrate focal cortical disturbances—all but 2 being temporal. Thus slightly over $\frac{1}{3}$ of the entire group of functioning community volunteers had EEG's presenting temporal electrographic disturbances. And finally, of this large group with temporal EEG abnormalities, 74% were left-sided disturbances.

The average age for the entire community series is 72.2 years, with the average age for the normal EEG group being 71.9 years, the focal group 71.7, mixed group 72.5, and the diffuse EEG group 73.5. When the latter group is broken down into fast and slow disturbances, we note that the average age for the fast group is 69.6 years and the slow group 80.0 years.

In the entire series of 223 community volunteers, 105 were men and 118 women. The breakdown as to sex distribution indicates 55% males to 45% females in the normal EEG group; 33% males to 66% females in the focal group; 46% males to 54% females in the mixed group; and 46% males to 54% females in the diffuse group.

An attempt was made to relate handedness to laterality in the focal and mixed EEG groups. Of the 67 people with focal EEG disturbances on whom observations of handedness were made, only 2 were left-handed. One of these presented a *left* temporal focus and the other a bitemporal one. Until a larger group of left-handed people with temporal foci are studied, we cannot say with final certainty that handedness is *not* related to temporal EEG laterality. However, at this stage there would seem to be little if any relationship between these two phenomena.

Psychological test correlations. Complete Wechsler-Adult Intelligence Scales, using all eleven sub-tests, were obtained from 87 Dur-

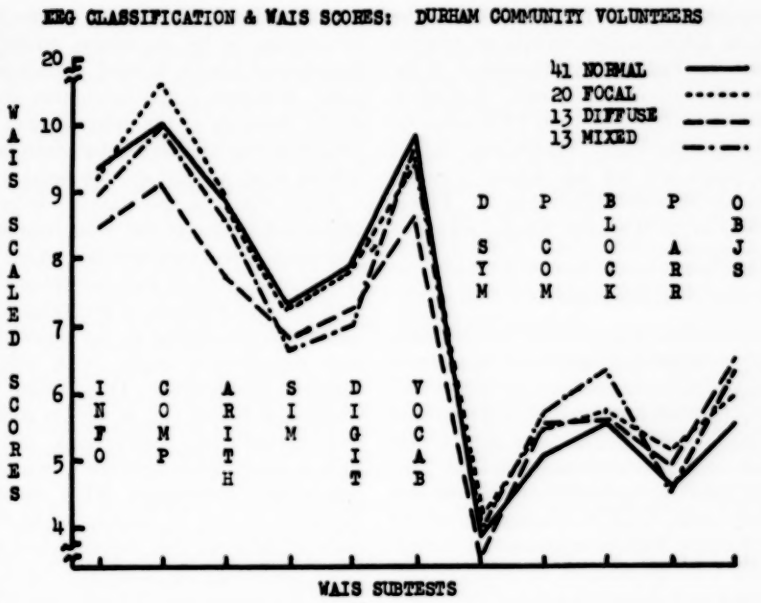

FIG. 6

ham community volunteers. These subjects were divided into the previously mentioned four groups on the basis of their EEG classifications, and the data analyzed to determine whether there was any impairment of performance for the abnormal EEG groups as compared to that of the normal group. The mean ages of these four EEG groups were quite close, ranging from 70.6 to 71.6. Figure 6 reveals that the mean weighted scores for the four EEG groups are almost identical. Statistical tests showed no reliable differences between the groups. Likewise there were no statistically significant differences in their I.Q.'s with the Full Scale I.Q.'s ranging from 94.92 to 99.70.

In order to examine the possibility that a larger N would reveal differences in intellectual functioning, the weighted scores on the Information, Vocabulary, Block Design and Digit Symbol sub-tests of the Wechsler-Bellevue, Form I, obtained on 66 Denver community subjects were combined with the weighted scores for the same sub-tests on the W.A.I.S. obtained on 87 Durham subjects, giving a total of 153 volunteers. It was felt reasonable to merge the scores on these two tests since the Wechsler-Bellevue, Form I, and the

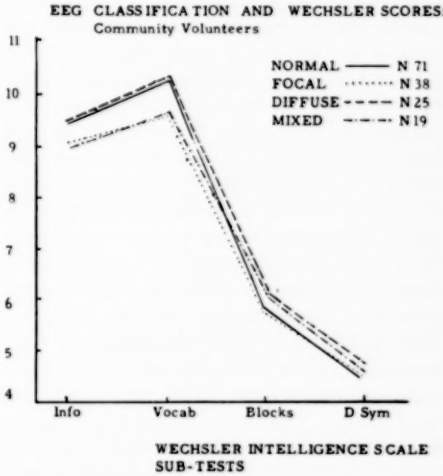

FIG. 7

Wechsler-Adult Intelligence Scale are purported to measure the same traits and since their weighted scores were derived by the same statistical procedures. Figure 7 reveals that the enlarged group still shows no differences in intellectual functioning between the four EEG groups.

Examination of the Rorschach scores of the 87 Durham subjects also reveals no reliable differences in Fisher Maladjustment Scale scores for the four EEG groups. Further a group of 20 normal and 20 focal EEG subjects, matched for Wechsler Vocabulary scores within 1 point and for age within 5 years, revealed no reliable differences in Fisher Scale scores or in Wechsler Block Design or Digit Symbol.

Discussion

Our expectations when tabulating this data were that we would find significant decrements in intellectual functioning for the diffuse and mixed group, when compared with the normal and the focal EEG groups. This expectation was based on a previous study in 1953 (10), at which time we reported on a *combined* community and hospital population of 60 years and older. Then it appeared as though individuals with generalized cortical disturbances, taken as a group, functioned much less well intellectually than those with normal and focal EEG's. In reassessing our data it would appear that combining the community and hospital groups into a single population may have produced this initial finding. Our present data, limited to a large, functioning group of community volunteers, demonstrate no such difference between psychological functioning and EEG grouping. We are currently in the process of making a similar comparison between these measures of psychological functioning and EEG grouping for a population of hospitalized elderly individuals, many of whom are senile. It may well be that for this group there will be significant decrements of functioning for those with generalized EEG disturbances as compared with the normal and focal groups. The work of Obrist and Henry (8), on a group of 100 psychiatric patients ranging in age from 65 to 95, would suggest such a relationship between psychological functioning and EEG patterns for hospitalized old people.

We are of the opinion that many, if not all, of the EEG disturbances we have observed in our Community groups of functioning elderly people (i.e., non-hospitalized population) are a reflection of organic and/or physiological changes in cerebral functioning occurring with aging. Why they cannot be correlated with careful and objective testing of psychological functioning is by no means entirely clear. Speculation here is beyond the scope of this paper. However, it may be another illustration of the plasticity of the intact human brain in compensating effectively for defects at the cellular level, at least up to a point.

A few words of speculation concerning the origin and nature of the focal temporal EEG disturbances will conclude this paper. Initially (1) we attempted to find correlations between such foci and evidence of generalized vascular pathology, proceeding on the assumption that such disturbances might be a reflection of vascular insufficiency. The careful work of Obrist and Bissell (7), as well as some of our own unpublished observations, did suggest such a relationship between vascular insufficiency and generalized EEG disturbances. However, to date we have found no such relationship between the temporal foci and vascular pathology as measured by a routine physical examination. We are currently studying vascular status by retinal photographs and microscopic studies of the bulbar conjunctiva in the hope of finding a relationship between vascular pathology and the focal temporal disturbances. These findings will be reported at a future date.

Currrently we are interested in studying these asymptomatic foci through longitudinal observations of these elderly individuals, particularly to see the over-all course of aging for these people as compared with those possessing normal EEG's. This may shed light on the process producing this phenomenon. Eventually we are hopeful of studying this at autopsy—something which is impossible with our current volunteer groups.

The question of the great predominance of left temporal disturbances, as compared with right temporal or bilateral foci, has both disturbed and stimulated us. Morel's studies (6) on ventricular size at autopsy—utilizing the brains of 423 cases, between 55 and 99 years—indicated that the left ventricles were consistently of greater capacity than the right, suggesting as one possibility that greater atrophy takes place on the left.

We have been intrigued in reviewing the recent literature concerning spontaneous thrombosis of the internal and common carotid arteries. Johnson and Walker (5) reported on

107 cases of their own and others and noted 65% were left-sided. Elvidge and Werner (3) reported on 6 cases, all of which were left-sided. They note, "Large collected series from the Swiss and Swedish literature show an average proportion of 2:3 (i.e. $66\frac{2}{3}$%) of occlusions on the left side." The Montreal group reported EEG's in 5 of their 6 cases, all showing a temporal or fronto-temporal focus of severe slowing. A number of reports (3, 5, 9) have pointed out the characteristic picture with air encephalography of ventricular dilatations on the side of the carotid thrombosis.

We are not implying that our elderly individuals with temporal EEG foci are suffering from a complete closure of the internal or common carotids on the side of the focus. As far as we know, in elderly people such a condition is clearly and usually strongly symptomatic, while our EEG foci are asymptomatic. However, the above reports and observations have led us to suspect that these foci may be a reflection of some degree of carotid insufficiency on the side of the EEG disturbance. This, at least, gives us an hypothesis which we are hopeful of testing in future studies.

Summary

1. A study of 223 functioning community volunteers, age 60 years and over, and without significant physical or psychiatric illness affecting central nervous system functioning, is reported.

2. Utilizing EEG standards established for younger adults, 49% of our aged group presented normal records. Twenty-five per cent showed pure focal EEG disturbances and 15% diffuse cortical disturbances. Eleven per cent demonstrated an admixture of diffuse and focal disturbances.

3. The focal disturbances were almost exclusively temporal in locus and largely (78%) left in lateralization. They presented predominantly anteriorly on the left.

4. Psychological test results, derived from the Wechsler Intelligence Scales and the Fisher Maladjustment Scale drawn from Rorschach data, indicate no significant differences in psychological functioning for the various EEG groups. Whether other psychological testing techniques or other methods of interpreting test data will demonstrate differences is an area we are currently investigating.

5. The possible implications of the lack of differences between psychological test data for the various EEG groups of community aged are briefly discussed.

6. Some speculations are presented as to the origins of the temporal EEG foci and their left-sided lateralization.

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ELECTROENCEPHALOGRAPHY, FREQUENCY ANALYSIS, AND CONSCIOUSNESS[1, 2]

A Correlation during Insulin-Induced Hypoglycemia

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This paper constitutes an initial report of the findings of an investigation into the psychopathologic changes occurring during individual insulin treatments. These findings attempt to correlate the patient's state of consciousness, as measured by specific psychologic tests, his EEG pattern, and the frequency analysis of these patterns.

Case Material and Methods

A. *Case material.* Ten psychiatric patients receiving subcoma insulin treatment were studied. On the days of the investigations, regular crystalline insulin in doses ranging from 400 to 1,000 units was administered to these patients. According to the criteria delineated by Frostig (3), eight patients reached Phase 3 or 4 of coma and two patients reached Phase 1 of coma. By the criteria used in this study, as described below, eight patients reached an established coma state, and two patients reached a pre-coma state.

B. *Psychologic tests and criteria.* Immediately prior to the administration of insulin, and at 55-minute intervals thereafter until termination of treatment, a series of tests was given to the patients. These tests consisted of a group of weak stimuli in six sensory spheres and a group of strong stimuli in five sensory spheres (table 1). The patient's responses to these stimuli were adjudged to be adequate or inadequate according to the criteria described in table 1. Initially, only the weak stimuli were applied; as the responses to these became inadequate or absent, the strong stimuli were applied.

In addition to these tests, the ordinary observations of pulse, respirations, autonomic status and myoclonic twitching were made. In the early stages of individual treatment, finer tests were done to elicit information pertinent to later phases of this investigation; these included tests of concentration, emotion, and finer discrimination and are not relevant to the present discussion.

The level of consciousness of the patient was evaluated in terms of the responses to the stimuli applied. Coma was defined as that state in which the patient showed no purposive response, adequate or inadequate, to the application of strong stimuli; reflex responses were not regarded as purposive. A "pre-coma" state was defined as that immediately preceding coma, and manifested by the absence of all adequate responses, and the presence of no more than two inadequate responses to strong stimuli. A "light" reaction was defined as that in which the patient demonstrated some diminution in perceptiveness or responsiveness, as indicated by a drop in the pre-treatment number of adequate responses to light stimuli.

C. *Electroencephalographic tracings.* Six monopolar scalp leads with yoked ear leads were used in making EEG tracings. The instrument used was a Medcraft 8-channel EEG. Tracings were taken every 15 minutes for a minimum period of five minutes, immediately preceding each application of the psychologic tests described above. This EEG was evaluated in the usual fashion. Because of the possibility that sleep might produce some alteration in the basic hypoglycemic-response patterns, tracings were frequently made immediately after testing; these revealed the same patterns as in the pre-test tracings.

D. *Frequency analysis.* An Offner Wave Frequency Analyser was connected with the EEG in such fashion as to yield an analysis of the frequency distribution from the right occipital scalp lead. Analysis was performed during all EEG tracings, with 10-second epochs

[1] Read at the meeting of the American Electroencephalographic Society, Chicago, Illinois, June 10–12, 1955.

[2] Department of Psychiatry, Cornell University Medical College, and The New York Hospital (Payne Whitney Psychiatric Clinic).

TABLE 1.—*Test of Perceptiveness and Responsiveness During Insulin Treatment*

Modality	Stimulus	Adequate Response
A. Weak stimuli		
1. Deep pain	Moderate pressure on thenar muscle.	Feels pain and describes it.
2. Superficial pain	3 or more pin pricks on back of hand.	Feels stimulus and describes it as sharp or dull on being asked "sharp or dull?"
3. Visual	1 to 5 fingers held up at a distance of three feet from patient's eyes.	Names correct number of fingers being held up.
4. Touch	Light touch on back of hand with piece of cotton while patient is not looking at hand.	Responds affirmatively when touched (says "yes" or "touch").
5. Auditory	Patient's name called with normal degree of loudness.	Pays attention to the examiner. If asleep, rouses and pays attention to examiner.
6. Movement	Mild shaking of shoulder.	Describes stimulus. If asleep, rouses and pays attention to examiner.
B. Strong stimuli		
1. Deep pain	Marked pressure on thenar muscle.	1–5: Patient may rouse from sleep and describe stimulus as in a test situation to examiner. Adequate responses would be similar to those for weak stimuli.
2. Visual	Flashlight directed at open or closed eye at distance of 3 inches.	or
3. Touch	Rough rubbing of finger across closed eyelids.	Patient may not rouse from sleep but may deal with stimulus as a noxious one. This is adequate only if the patient's actions are organized and if they obtain the purpose of eliminating the stimulus in an organized fashion. Thus, grabbing examiner's hand and moving it away, or covering the eyes with the hand while trying to remove examiner's hand, would be examples of adequate responses. Mere thrashing about, turning head, groaning, closing eyes, or other passive or fruitless activity is inadequate.
4. Auditory	Loud name-calling or shouting.	
5. Movement	Vigorous shaking of shoulder.	

being recorded on the EEG paper. Twenty-four frequencies, ranging from 1.5 to 30 cps., were analyzed in each epoch.

E. *Evaluation of frequency analysis.* At the completion of each individual's test, the frequency analysis tracings were examined. Six artifact-free epochs recorded closest to the time of application of psychologic tests were selected, and the lengths of the 14 pips covering the frequency range from 1.5 cps. to 12.0 cps. were measured. The heights of the analyzer baseline were subtracted from these heights. For each six-epoch series, the following material was then computed: 1) Total electrical activity at each frequency, as measured by the sum of the pip heights at that frequency, 2) total electrical activity of all frequencies, 3) percentage of total electrical activity at each frequency. This material was then integrated, graphically, with the results obtained from psychologic tests. Figure 1 represents a simplified version of such a graph.

Results

A. Changes in consciousness

Eight of the ten patients reached an established coma state. According to the evaluation described, the first alteration in perception or response to weak stimuli occurred an average of 123.5 minutes after the injection of insulin. Orientation was present in one or more spheres for a slightly longer period, but was completely lost 145.5 minutes after injection. The patients no longer responded to any weak stimuli 176.5 minutes after injection, and reached a precoma state 186 minutes after injection. No responses were obtainable, and the patients were therefore considered to be in coma 225.4 minutes after the injection of insulin.

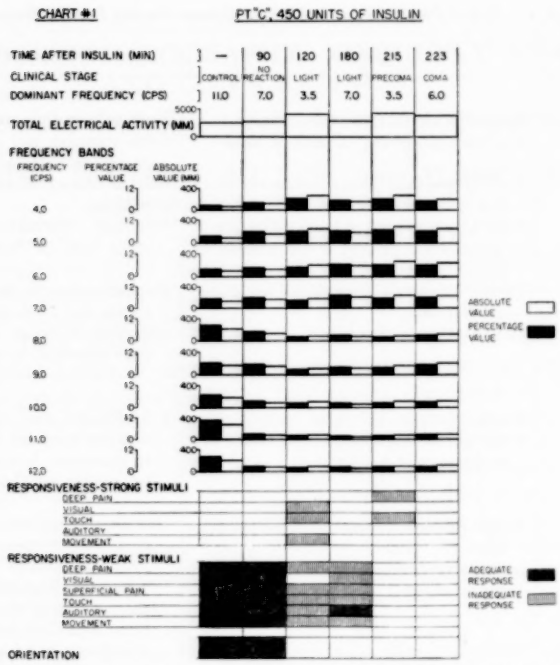

FIG. 1. Strong stimuli were used only when the patient responded inadequately to weak stimuli.

B. Visual examination of EEG tracings

Within 90 minutes of the time of administration of insulin, during that period of time when the patient showed little or no clinical response, profound changes were manifest in the EEG tracings. These changes were characterized by increase in voltage, and a considerable amount of 3–5 cps. slowing, with baseline sways. The tracing showed intermittent periods of desynchronization.

Subsequently, there was a gradual increase in these changes (more activity, higher voltage, and greater disorganization). In general, these characteristics continued when the patient entered pre-coma and coma. In some cases, however, pre-coma or coma tracings revealed somewhat lower voltage, less slowing, and slightly more organization than had the tracings recorded before coma.

C. Frequency analysis of EEG tracings

1. *Amount of electrical activity.* A sharp rise in total amount of electrical activity was observed. The greatest increase occurred in the first 90 minutes after injection of insulin, and continued slowly thereafter. The initial average amount of activity was 1994.1 mm. This increased 66 per cent to 3317.4 mm. when the patients reached a pre-coma state, and increased 67 per cent to 3333.2 mm. when the patients reached a coma state.

2. *Alpha activity.* Initial average alpha activity was 759.5 mm., comprising 38.1 per cent of the total amount of electrical activity as described above. Within 90 minutes of the injection of insulin the amount had decreased markedly, but thereafter remained at a constant level. Thus, the average alpha activity when the patient reached pre-coma was 298.5 mm. or 8.9 per cent of the total activity; when the patient reached coma, the amount was 333.6 mm., or 10.0 per cent of total activity. The percentages of diminution from the baseline amount of real electrical alpha activity in pre-coma and coma were 60.7 per cent and 56.1 per cent, respectively. In contrast, there was a greater degree of drop in the alpha percentage of total activity, which measured 8.9 per cent and 10.0 per cent in pre-coma and coma; these percentages represent a diminution

of 76.7 per cent and 73.8 per cent, respectively, from the baseline percentage.

3. *Predominant frequency patterns.* Although alpha activity remained throughout, every patient showed predominant slow activity within 90 minutes of the injection of insulin. From that point on, slow frequencies dominated the analyzed frequency pattern. The heavy amount of activity between 1.5 and 3.0 cps. was observably related to movements of the patient. Since they were never more than an insignificant amount higher than the amount in the 3.5 to 5.0 cps. range, we have withheld judgment in the 1.5 to 3.0 cps. range, and have omitted them from the following description.

The initial pattern of slow activity is marked by an increase in the amount of activity in each frequency from 3.5 to 7.0 although the dominant frequency might be any of these. In most cases the 3.5 to 5.0 cps. range was most important from the beginning, but in two patients 6.0 or 7.0 cps. was dominant for a short period. In four of the eight patients, the 6.0 or 7.0 cps. activity remained stable from 90 minutes after injection until the establishment of coma, but became less important percentage-wise because of the continuing rise of activity in the 3.5 to 5.0 cps. range. In the remaining four patients the 3.5 to 5.0 cps. activity increased, and in addition the 6.0 and 7.0 cps. activity decreased as the patient approached coma.

The pattern of slow activity centered largely in the 3.5 to 5.0 cps. range from the beginning, therefore. This pattern was in effect an average of 80 minutes before the patient reached a state of pre-coma, and was in effect an average of 120 minutes before the patient reached a state of coma.

4. *Dominant frequency.* Changes in the dominant frequency corresponded with changes in the over-all pattern of activity. Initially, the dominant frequencies ranged from 9.0 to 11.0, averaging 10.1 cps. This dominance disappeared within 75 minutes of the time of administration of insulin. A gradual shift took place as the dominant rhythm progressed slowly down the frequency levels. When the patient was in a pre-coma state, the dominant frequency ranged from 3.5 to 6.0, averaging 4.1 cps.; this frequency had achieved dominance an average of 46.5 minutes before the onset of pre-coma. Similarly, when the patient reached coma, the dominant frequencies ranged from 3.5 to 6.0, averaging 4.1 cps.; this frequency had achieved dominance an average of 65.6 minutes before the onset of coma.

The changes in the amount of electrical activity in the initial dominant frequency were also similar to changes in the pattern of alpha activity. The initial dominant frequency had an average amount of electrical activity of 280 mm., comprising 13.5 per cent of total electrical activity. By the time the patient had reached a coma state, the amount of electrical activity at this frequency had decreased to 88.8 mm., which comprised 2.5 per cent of total electrical activity. Thus, although there had been a decrease of 74.6 per cent in the absolute amount of activity of the initial dominant frequency, the increase in activity in other areas had caused the decrease in the percentage of total activity to fall 84.8 per cent.

Discussion

This study developed from the authors' investigation of the possibility of establishing a correlation between EEG and emotional changes in various states of consciousness. Since insulin treatment seemed to afford an opportunity to study a single patient repeatedly, we proceeded toward the establishment of a baseline of known EEG patterns correlated with known levels of consciousness.

Many studies with the EEG during insulin treatment, however, contained definitions of consciousness and coma that seemed centered on physiology or on treatment rather than on the psychopathologic area we intended to investigate. Thus, a standard text like Bleuler's (1) defines consciousness in terms of perception of and responsiveness to stimuli, and unconsciousness as "the absence of conscious psychisms". In articles by Frostig, however, definitions like those of Bleuler are used originally (2), but later become less important as the definitions come to reflect a succession of possible neurophysiologic changes (3).

For the purposes of our study, therefore, the method of evaluating perceptiveness and responsiveness, as previously described, was evolved. The criteria used by Bleuler (1) and

by Frostig in his original work (3) can be applied to this method of evaluation, with our "pre-coma" state the equivalent of their "stupor", and our "coma" the equivalent of Coma Phase 3 or 4. This method has the advantage of being more explicit, furthermore, and allows repeated studies of the patient at identical levels of consciousness, as is necessary for the purposes of our projected study. It has also been effective clinically, and is regularly used during all insulin treatments at the Clinic.

When EEG findings in the literature during insulin treatment are studied, it is extremely difficult to correlate them with changes in consciousness, and the findings are usually not supported by frequency analysis. Thus Himwich *et al.* (6, 7, 8), reporting on a total of seven patients, describe an absence of alpha activity in coma and state that there is a sharp cessation in alpha activity when the patient enters coma. Their definition of coma, in terms of consciousness and responsiveness, is not clear. Gibbs and Gibbs (4) describe a decrease in the total amount of electrical activity and a "sudden shift toward the slow side" during hypoglycemic states, with no observations on consciousness. Weinland (13) uses the terms pre-coma and coma and describes an amorphous pattern with sharp spikes, irregular 1–3 cps. waves, and no alpha activity in coma, and states that the latter disappeared 30 minutes after insulin administration.

As opposed to these descriptions of complete disappearance of alpha activity, several articles suggest its continuation. Thus Hoagland *et al.* (9) working with six patients state that "during coma the alpha frequency was reduced to 60 or 70 per cent of its pre-insulin value", and that the delta index increases progressively during the treatment. In another article (10) they note that the "broken up appearance" of the EEG begins to appear as long as an hour before coma is clinically present. Kalinowsky and Hoch (11) note that "slow waves" appear during insulin treatment when patients do not show clinically impressive signs of hypoglycemia, and that "mild coma" may exist without marked EEG changes. In Hill and Parr (5) it is emphasized that alpha activity may be present even in highly abnormal records during insulin treatment. In a recent report, Solis and Vara Lopez (12) indicate a gradual reduction in frequency of dominant activity, but do not mention the course of alpha activity. Furthermore, they use the physiologic criteria of treatment level derived from Frostig and Himwich, and their findings are difficult to correlate with consciousness.

After a review of this literature, the authors concluded that the various reports involved too many conflicts, and that the criteria for consciousness and unconsciousness were too vague to allow for finer psychopathologic and neurophysiologic investigation. The present study was undertaken, therefore, to establish a secure baseline on which future work may be done. Our findings indicate that, as the insulin effect progresses, there is a gradual increase in total activity, with a decrease in alpha activity and an increase in slow activity. These changes follow an orderly pattern, with variations among individual patients; patients who have had repeat studies (not reported here) follow their own pattern during successive treatments.

These EEG patterns establish only a general relationship with the patterns of alterations in consciousness. The latter also follow a regular progression, with individual variations. The most prominent result of this study, in terms of the correlation of consciousness and EEG findings, is that the pattern of the EEG which is found in coma is usually well established long before the onset of coma. The coma pattern appears an average of 120 minutes before coma itself appears, at a time when the patient can still perceive and respond adequately to stimuli, and frequently when he is fully oriented. The EEG pattern then remains unchanged during the gradual disappearance of the patient's orientation, responsiveness, perceptiveness and consciousness.

Summary

Ten psychiatric patients receiving insulin treatment have been studied with periodic observation of their tested level of consciousness and of their EEG-frequency analysis patterns. The results indicate the following facts:

1. The EEG pattern during insulin-induced coma is not distinctive to coma, but becomes

predominant while the patient still maintains good contact with his environment. In the 8 patients who reached coma, the coma EEG pattern was dominant for an average of 120 minutes prior to the onset of coma. The same EEG pattern existed in the 2 patients who only reached pre-coma.

2. The EEG pattern during the insulin-induced coma is largely composed of high voltage 3–5 cps. activity.

3. Alpha activity diminishes to an average of 44 per cent of its initial value while the patient is in insulin-induced coma. This reduction, however, takes place more than 2 hours before the onset of coma and remains stable thereafter. Because of the concomitant increase in the amount and voltage of slow activity, the alpha activity in coma comprises a proportionally smaller percentage of total electrical activity, and the amount of alpha activity cannot usually be judged by visual inspection of the regular EEG tracings.

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THE PSYCHIATRIC WARD AS A THERAPEUTIC COMMUNITY

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The value of the hospital community, as a therapeutic force supplementing individual psychotherapy, is attracting increasing attention. Patient groups in a psychiatric ward will exert a therapeutic influence on some group members whether or not the hospital fosters the development and expression of such group forces. Nurses, attendants and other ward personnel will endeavor to aid in the rehabilitation of patients whether or not they receive the desirable encouragement and direction from the medical staff. The physicians may or may not extend their participation in treatment beyond the privacy of the therapy hour. Adequate development of the potential therapeutic influence of both patients and staff requires continued active effort by the senior medical and nursing personnel. Pioneers of the community approach to treatment have rightly emphasized their achievements but have not always described fully the rigors of their early trials and tribulations. Our aim is to focus attention on the problems encountered in the development of a therapeutic community on a psychiatric ward.

This report is based on experience gained during the last two years in the wards of the Colorado Psychopathic Hospital. Our limited success in reaching the levels obtained by longer established therapeutic communities is offset by the freshness in our minds of the initial difficulties. The 75-bed, four-ward hospital provides diagnostic and therapeutic services for residents of Colorado. Patients admitted for treatment remain from three to six months or longer while those admitted for diagnostic evaluation remain from 10 to 30 days. The treatment group is composed largely of psychotic patients but includes patients suffering from neurosis or character disorder. Emphasis is given to psychotherapy, but electrotherapy is also employed in selected cases. The diagnostic group includes seniles and other chronic psychotics not likely to respond to psychotherapy, patients found to be suitable for out-patient treatment, alcoholics and sociopaths who are not motivated for treatment, and suspected criminals admitted for examination following a plea of insanity. The 10 to 30-day stay of this group does not lend stability to the social structure of the hospital and tends to interfere with the development of a therapeutic culture. These patients do not remain long enough to contribute significantly to the constructive aspects of patient community endeavor. Sometimes they provide a disruptive background, and it is not always possible in the time available to resolve any antisocial attitudes which they may show. They cannot be expected to enter into long range patient enterprises although a surprising number do.

In order to facilitate the development of an improved social structure within the hospital one ward was unlocked, and two of the wards were converted to provide accommodation for both sexes. The presence of male and female patients on the same ward may create administrative problems but more closely resembles the community to which patients will return. On the background of these and other administrative changes the development of the therapeutic community will be considered in regard to the nurses, the doctors and the patients.

The Nurse in a Therapeutic Community

The nurse in a therapeutic community is required to perform a role far different from the one to which she has previously been accustomed. She must be more flexible, less dependent on rules and regulations, and above all she must be willing to enter into a much closer relationship with patients than formerly. In this new situation her previous training may be a handicap rather than an asset. Once a therapeutic community has been firmly established, the new nurse will receive considerable support from established tradi-

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tions as she makes her adjustment to the new role. This support is lacking, however, during the period of transition in which the hospital is endeavoring to adopt the community approach. At this time, the nursing group is divided into factions. At either extreme are those who enthusiastically endorse or actively oppose the new approach. The latter faction is composed largely but not exclusively of nurses with many years of service but without the benefit of training in dynamic psychiatry. In this group will be found very conscientious nurses who over the years have acquired a remarkable intuitive knowledge. They are quick to note even slight changes in the progress of their patients, are sensitive to the appearance of suicidal trends, and may have an uncannily accurate diagnostic sense. Their skill unfortunately does not always extend beyond diagnosis to therapy.

They are quick to warn new nurses of the dangers of becoming "too involved with patients". They have a long list of examples which supposedly illustrate the dire consequences of any extension beyond a superficial nurse-patient relationship. The junior nurse is impressed by these reports. Inexperience and inadequate previous psychiatric training may prevent her from recognizing that these unfortunate examples represent lack of supervision or individual psychopathology rather than an indictment of attempts to relate therapeutically to patients.

These nurses spend much time in ward routines such as checking dangerous devices, counting silverware, and so on. Four-hourly temperatures and pulse recordings are made when a daily record would be sufficient. The ward clerk sits idle at her desk while the head nurse wrestles with duty rosters. Rules are observed inflexibly. When a new situation arises which is not provided for in the hospital manual, a directive is sought from the administrative physician. Rigid admission procedures are followed without full regard to the patient's feelings. The patient's behavior is recorded meticulously, but no attempt may be made to understand its meaning. Ward routines become the focus of attention rather than the patient. Preoccupation with these routines isolates the nurse from her patient as in the following example.

> Mrs. S., a schizophrenic patient became very distressed without apparent cause. She walked up and down, pulling at her hair and wringing her hands. The senior nurse rang her doctor who, as he was unable to come to the ward, ordered a sedative. In the meantime, a junior nurse had discovered that Mrs. S. was upset by her husband's failure to visit her that afternoon. This discussion reassured the patient. The senior nurse then appeared and insisted on Mrs. S. taking the sedative although it was no longer indicated.

The number of senior nurses who conform to this picture is small, but their influence on other nurses may retard significantly the development of the therapeutic community. Those nurses who subscribe to a more dynamic approach include nurses who have either been trained in this approach or who are more flexible in their outlook. We were fortunate in having for eight weeks at a time student nurses who had received excellent tuition from instructors of the University of Colorado School of Nursing. The major emphasis in their training is on the nature and problems of interpersonal relationships. They are taught to consider not only the patient but also their own attitudes and feelings as they effect their relationship with the patient. These nurses despite their short period in the hospital made a definite contribution to our program not only because of their enthusiasm, but also because they had not been exposed to more orthodox practices or to custodial nursing care. The majority of the graduate nurses had not had the benefit of such instruction as part of their training, and many of them felt threatened by the student nurses. The hospital was unable to provide the intensive tuition received by the student nurses. Furthermore, it was difficult to refer to the accomplishments of student nurses in interpersonal relationships without further threatening the security of the staff nurses. The more intuitive nurses did surprisingly well despite their lack of formal training.

In addition to the two groups of nurses which either opposed or supported the therapeutic community approach, there was a middle indecisive group which was swayed by the more dominant faction of the moment. Every effort was made to clarify to all three groups the aims and purposes of the therapeutic community. Lectures were not found to be suitable for this purpose. They tended to

provide intellectual understanding but did not lead to practical application on the ward of the newly acquired knowledge.

Informal group meetings provided a better learning situation. In these meetings explanation of the principles upon which the therapeutic community is founded could be given in a setting which permitted operational practice of the principles under discussion. Traditional patterns of behavior were sometimes in evidence at ward staff conferences. An arbitrary ruling on some ward problem would be sought from the ward administrative physician rather than referring the problem back to the community for solution. For example at a ward staff conference it was reported that a few male patients were controlling selection of television programs to the annoyance of the female patients. The nurses requested that definite rules should be typed out and attached to the television set. Nothing had been done to help the female patients deal with the problem themselves. Instead the nursing staff joined in complaints about the behavior of the men concerned. It was only after much discussion that one nurse suggested that the women patients should be encouraged to voice their grievances at a weekly patient-staff meeting. The concept of community responsibility for ward problems was not readily accepted by the nurses. Gradually nurses became less rigid in their approach to ward problems as illustrated in the following example.

A complaint was made at a ward staff conference that a wardmaid had invited a patient out to dinner contrary to a long standing hospital rule. Following discussion it was agreed that the rule should be abolished and that each case should be considered individually by the head nurse. The maid was much relieved when approached by the head nurse. She was able to reveal information about the patient which was helpful to the therapist, and no difficulties arose from her social contact with the patient.

Ward staff conferences often brought to light information not previously known by the head nurse. It soon became apparent that the nurses' reports passed on from one duty shift to another consisted largely of stereotyped comments, based on information so stale and incomplete as to render unlikely the development of dynamic understanding of patient behavior. At these reports the attendants played a passive role and seldom contributed to the discussion, thereby sharply limiting the value of the report. Ward meetings, in which all members of the staff participated freely, demonstrated the therapeutic advantages which accrued from sharing of information.

At a ward conference, complaint was made that Mrs. D. was stealing other patients' clothes. Various suggestions were made that the patient should be transferred to a locked ward, locks should be provided for the lockers, and so on. It was stressed that no attempt had been made to find out why the patient was stealing. This led to further discussion. It was disclosed that Mrs. D. as a child had always had to wear the cast off clothes of an elder favored sister. Her husband, an epileptic, seldom visited her and showed little consideration for her. The patient had only one dress to wear while in the hospital. The husband was requested to bring her more clothes, and there was no further stealing.

Many similar experiences gave the nurses a greater understanding of the importance of knowing their patients. As they developed greater skills, they became less dependent on their supervisors and their doctors and less insistent on restrictive regulations.

Each nurse was assigned from four to six patients. Previously the assignments had been changed from week to week, but this practice was discontinued for obvious reasons. Assignments were not made arbitrarily on a rotation basis as formerly, but rather on an understanding of the patient's needs and the nurse's skill in meeting these needs.

At weekly staff meetings a nurse would present a brief case history which was usually a condensed version of the doctor's notes abstracted from the chart. This practice was discouraged as the discussion tended to become somewhat theoretical and remote from the patient as a person. It was some months before the nurses were able to present a report of their interpersonal relationships with the patient rather than confining themselves to a formal review of the patient's life history. Although the focus was always on the patient, gradually increasing attention was given to counter-transference attitudes of the staff.

Nurses were encouraged to select one or two of their patients for more intensive care. This care varied from support to therapy which required more skill in interpersonal relationship than is usually expected of the psychiatric nurse.

The nurse's psychotherapeutic role is not to provide psychotherapy in terms of dealing with basic conflicts but rather to provide a relationship which is helpful to the patient. She may be assigned limited specific therapeutic goals. Counselling is provided to increase her understanding and awareness of the feelings, thoughts and actions of the patients, and how to deal with them according to the physician's treatment plan. Counter-transference reactions may require attention in counselling.

At first only two or three nurses volunteered to undertake more intensive care. The majority of the nurses in spending more time talking to patients had become acutely aware of their difficulty in responding to patient's feelings, in discussing delusional ideas, and in accepting critical or personal comments. They were reluctant therefore to accept the responsibility entailed in a more significant therapeutic relationship. Those nurses who accepted an individual psychotherapeutic role were exposed to criticism from other nurses. Thus a recent graduate who had developed a significant therapeutic relationship with a very demanding young male schizophrenic patient was told that the relationship was a social one and not therapeutic. Comments such as the following were made to her. "Did you add another chapter to your novel today?" "Well, do you really think you are doing him any good?"

Nurses like doctors vary in their potential psychotherapeutic skill, and the hospital should not expect less gifted nurses to achieve the levels reached by their more talented colleagues. It is important to provide counselling at frequent intervals during a nurse's first attempts to relate therapeutically to patients. Otherwise, early errors in technique may result in unfortunate experiences which serve to reinforce the gloomy forebodings implanted by more senior but less therapeutically oriented nurses.

A nurse decided to work with a middle-aged schizophrenic patient. She did not, however, clarify her role to the patient. Finding it difficult to talk to him in the crowded dayroom, she asked him to come into one of the single rooms. As there was only one chair in the room, she sat on the bed. The patient misinterpreted her intentions, and at the second interview, he attempted to embrace her. Surprised and embarrassed by the situation, the nurse was at a loss how to handle it. Only at this stage did she seek counselling, but by this time she was discouraged and pessimistic.

Several male patients misinterpreted nurses' interest in their problems as an indication of personal attachment. When active overtures were made by patients, the nurses at first responded by complete withdrawal from any further association with the patient. Later with guidance they were able to discuss the problem with the patient and maintain an uninterrupted therapeutic relationship. Counselling was also indicated when nurses or attendants because of personal problems showed attitudes which were at variance with group therapeutic aims and policies.

Mr. S. who had a masters degree in social work applied for an appointment as an attendant in order to gain clinical experience with patients. As the years went by he made no attempt to obtain a position more appropriate to his academic qualifications. It was apparent that deep seated insecurity feelings made it difficult for him to seek more suitable employment. However, he continued to rationalize his reasons for remaining an attendant. At the same time, he mistakenly felt he knew more than the other staff about psychiatric patients. He rarely voiced his opinions at ward meetings but quietly went his own ways which were often at variance with the policies agreed to in ward conferences.

Another attendant with strong aggressive feelings which he was unable to express spent much time with aggressive antisocial psychopathic patients and indirectly encouraged them to act out against the staff or other patients.

Reference has been made to the nurse's role in the therapeutic community. The role of the psychiatric nurse is centered around her skill in handling interpersonal relations in a therapeutically useful manner. Tudor (1) has further defined this role by stating that the nurse functions 1) to facilitate the patient's communication, 2) to facilitate the patient's social participation, and 3) to fulfill the patient's needs. The psychiatric nurse is also required to have administrative skills which should not, however, become an exclusive interest. The senior administrative nurse must set aside time either for individual patient care or for direct participation in community activities and should also act as a counsellor for less experienced nurses. Otherwise she will lose touch with the community, and her

administrative skill will not be exercised in the best interest of the community.

The Physician and the Therapeutic Community

The therapeutic community makes increased demands on the medical staff. The physician is exposed to freer and more sophisticated expression of opinion by nurses and attendants. His administrative decisions may be challenged by the entire patient group at their weekly meetings. Provision of regular counselling sessions for nurses undertaking special care of patients is an added task for the busy physician. If the nurse is inexperienced, her cooperation in therapy may prove a burden. Yet if she is to play her full role in the community, she must be given adequate help, however time-consuming this may be initially. The occasional first-year psychiatric resident may feel threatened when the nurse is more successful in establishing rapport with the patient. Then, the resident may neglect to see the nurse, adopt a critical attitude, or be so impatient as to deter her from seeking further help. As failure in communication between therapist and nurse may affect the patient adversely, the ward administrative physician should be alert to recognize such failure and be ready to provide tactful remedial action.

Free communication between all members of the therapeutic team is a *sine qua non* of the therapeutic community. Informal team meetings attended by the patient's therapist, nurse, psychologist, social worker, occupational therapist and ward administrative physician reduce the likelihood of hidden staff disagreements. At first, the psychiatric residents seldom called such meetings, and the senior staff had to exert continued pressure until the benefits derived from the meetings served to act as a motivating force. The ward conferences frequently brought to light breakdowns in communications but did not always resolve them.

A senior physician, Dr. C., complained to a senior administrative nurse that one patient spent each day sitting in the main hospital lobby or loitering outside the social workers' offices. Dr. C. complained that this inactivity was not helpful to the patient and indicated a failure in the hospital's attempt at rehabilitation. The senior nurse misinterpreted this complaint as an official instruction that patients were not to be allowed to sit in the hospital lobby. At a subsequent ward conference, it was disclosed that another patient had been requested to leave the lobby. The patient, who was an explosive, irritable character neurotic, became very indignant and threatened to leave the hospital. The ward physician when told that this was a new rule of Dr. C. thought that Dr. C. did not have in mind an absolute rule forbidding patients to sit in the lobby. Neither the nurses nor the ward physician, however, consulted Dr. C. Instead, the nurses complained among themselves that the doctors were inconsistent, and the nurse followed an indecisive, vacillating policy which seemed only to irritate the patients.

Misunderstandings, even over trivial decisions, may have far-reaching consequences. Difficulties in communication frequently occur when one person or group is angry with or fears rebuke from, another person or group. The responsibility for resolving obscurities in communication ultimately falls on the physician as leader of the therapeutic team or as ward administrative physician. Whenever doubt arises as to the meaning of some communication, all parties concerned should be consulted promptly, and the problem should not be laid to rest until remedied. All too often there is a tendency toward procrastination, especially when there are interpersonal problems among the staff. Such delay may have a serious effect on the whole ward as in the following example.

At the time when the nurses were first being encouraged to report on their experiences with patients, Dr. B., a psychiatric resident, was the administrative physician on the ward. He thought the nurses were too reticent in discussion at the meetings and felt that one ward staff conference should be devoted to a discussion of this problem. He told the head nurse that he would question the nurses directly at the meeting and insisted that they bring up their problems. The head nurse, who had been attending the meetings for a much longer period, felt differently. She had seen gradually increasing participation by the nurses and thought that good progress was being made. She further considered that the doctor would probably criticize the nurses without giving them support. She sensed too that Dr. B. felt considerable rivalry with Dr. O., a senior physician who also attended the meetings. By tactful remarks she was able to postpone the intended "frontal attack" planned by Dr. B. She suggested that the resident should discuss the matter further with Dr. O., but this suggestion was not followed. Instead, Dr. B. confined himself to making critical remarks to the head nurse about Dr. O., the senior physician. One week, he suddenly advanced the day of the ward conferences but did not notify Dr. O. of the change. The following week, he devoted the time usually spent in group dis-

cussion by giving a prepared talk on schizophrenia. The lecture was delivered rapidly in technical terms and was not understood by the majority of those present. He cancelled a conference on short notice because the case intended for presentation was "not suitable for discussion". He failed to appear at the next conference and later expressed dissatisfaction to the head nurse about ward activities. By this time, the morale of the ward had suffered considerably. As so often happens in situations of this type, there was undue delay in facing up to the problem and dealing with it directly. The procrastination was partly due to an optimistic expectation that the situation would resolve itself as Dr. B. gained more experience and more confidence in conducting the ward conferences. At this stage, Dr. B. was approached. He was much relieved when the subject was broached. He had considerable feeling about being much older than the average psychiatric resident, and he felt very inadequate especially when called on to lead a group discussion.

In order to give all the psychiatric residents experience in ward administration during their year of training in the hospital, they were each assigned to a ward for a two-month period. The frequent change of administrative physicians together with their varying attitudes created difficulties. Furthermore, the majority lacked sufficient experience to give the lead which was required during this transition period. This plan was therefore discontinued, and a senior physician was appointed permanent ward administrator on each ward. This provided the necessary continuity and support, but the decision was made reluctantly as all the residents benefited from this experience and some were remarkably successful in their duties. The resident who has served as a ward administrator gains a better understanding of the ward community and the special problems of the nurses and attendants. When the therapeutic community is more firmly established, residents will again be given an opportunity to function as ward administrators.

The senior physician plays an important supportive role especially in the early stages of the program. This role should be constant. Irregular or inadequate support reaps its own reward as in the following example.

A senior physician, Dr. E., conducted his ward conferences with great enthusiasm and outlined ambitious plans for the future. The ward staff, fired by his enthusiasm, developed unrealistic goals which they were unable to meet. Several set-backs dampened their ardor, and Dr. E. himself became somewhat dispirited. He visited the ward less frequently, and the nurses complained that he always seemed to be in a hurry during his appearances on the ward. They did not feel free to detain him and, therefore, cut short their reports to him. Nevertheless, they did continue to spend much time with the patients but with an increasing realization of their inability to deal adequately with interpersonal relationships. Each week at ward conference, Dr. E. emphasized the necessity for nurses spending more time with patients and implied that not enough was being done in this direction. The ward personnel became discouraged, and one nurse remarked, "Dr. E. doesn't seem to think we are doing enough to help the patients. I think we have improved a lot. He has offered to help us individually but he never seems to be available." Thus the nurses and attendants who were constantly being told to do more became increasingly frustrated. Dr. E. sensed their irritation with him and began to miss ward conferences, explaining that he had other pressing appointments.

It cannot be overemphasized that progress will at first be slow. Although one may point to future attainments, one should not have unrealistic immediate goals. Failure to reach impossible goals creates a pessimistic attitude which makes further movement more difficult. Continued enthusiasm and support from the senior staff are essential if obstacles are to be overcome.

The Patients and the Therapeutic Community

The first task in the formation of a therapeutic community is the modification of traditional nursing attitudes. As this is accomplished, a more permissive hospital social structure develops which encourages acceptance of greater social responsibility by the patients. From the outset, patients were kept informed of proposed changes, and their advice was solicited. Effort was made to improve communication between staff and patients and to promote a greater measure of self government. The patients demonstrated their readiness to accept responsibility when given the opportunity to exercise it. That many of the old rules were pointless was shown by the reaction of the patients to a rule forbidding them to have matches. Several patients complained that they no longer had the pleasure of smuggling matches on to the ward. Communal responsibility for ward problems was neither understood nor accepted so readily. Thus, patients would request the transfer of a patient with irritating behavior to another ward rather than request advice as to how they might help the offending patient make a better social adjustment on the ward.

The concept that patients have a therapeutic role as members of the community has not been stressed directly. Spontaneous movement in this direction has been encouraged. At ward meetings, the patient group has frequently demonstrated its awareness of the therapeutic needs of individual patients and has attempted to meet these needs. For example, an insecure anxious patient who remained silent at ward meetings was appointed by the group as a member of a special committee. This appointment gave him considerable prestige but did not demand so much from him as to further increase his anxiety. Achievements in the area of patient participation in the therapeutic community do not compare with those obtained by Maxwell Jones (2).

Every effort was made to emphasize that treatment is not confined to the therapy hour with the physician. The viewpoint that the whole of a patient's time in the hospital should be thought of as treatment was not easily grasped either by nurses or patients. Thus the patients were not alone in regarding occupational therapy simply in terms of knitting or making leather wallets. The broader implications of occupational therapy and other hospital activities had to be explained repeatedly to all groups within the hospital. The purpose of these activities is not so much to please the patient but to prepare him for return to the community outside the hospital. These activities provide a continuing opportunity for the study and resolution of interpersonal problems and for the practical application of insights gained in therapy.

The Changing Social Structure of the Ward

During the initial period of transition from the conventional ward social structure to that of the therapeutic community there was much anxiety within the nursing group. The accommodation of both sexes on two of the wards and the unlocking of one ward aroused particular concern. Some attendants feared they would lose their jobs because patients on an open ward would be absent from the ward much of the time. The greater distribution of responsibility among all members of the staff and the reduction in number of rules aroused feelings of insecurity. Later the security derived from regulations was replaced by the security derived from greater participation and sense of achievement in patient care. An obsessive senior nurse was unable to adjust to the increased demands of the new social structure and resigned. The morale of the nursing staff fluctuated considerably, but at a time when other hospitals were closing wards because of a shortage of nurses, the Psychopathic Hospital had its full complement of nurses despite its lower salary scale. Furthermore many graduate nurses from other states, who came to the hospital for four weeks in order to meet State Board requirements for registration in Colorado, remained as permanent employees despite their original intention to seek employment in non-psychiatric hospitals.

To some extent but not as much as was expected, tension within the staff group effected the patient group. The patients approved the changes being made and in many respects proved more flexible than other groups in the community. Some of the elderly patients expressed concern, and their attitudes toward the changes were similar to those of conservative staff members. The relaxation of rules resulted in some difficulties as the nurses and patients did not immediately accept that measure of personal responsibility which is necessary in the absence of definite regulations.

The most notable change was the development of a pseudo-therapeutic culture on the ward. Thus nurses appeared to be participating in greater and more meaningful interaction with the patients. Closer study showed that appearances were deceptive. The nurses station became less congested and new activities appeared on the ward, but behind this facade it was clear that many patient-nurse interactions were of a very superficial character.

Following abolition of a rule which prevented nurses from accompanying patients outside the hospital except for walks conducted by the Recreational Therapy Department, nurses began to go with patients to the local drug store for coffee. This activity was regarded as treatment, and sometimes it was associated with the development of a significant therapeutic relationship. More often it became a ritual and as much a form of isolation from meaningful interaction with the patient as the handing out of medicines or the routine record-

ing of pulse and temperature. When nurses did attempt to explore patients' thoughts and feelings, they frequently became embarrassed and ill at ease, with the result that they spoke and acted in a stilted artificial manner. There was a tendency to substitute physical activity or endless repetition of jig-saw puzzles, card games, checkers and so on for that private conversation which involved greater emotional demands on the nurse. With a false air of bonhomie and forced zest, nurses embarked on a continual round of social activities with patients. In one ward, the weekly weighing of patients became a hilarious procedure, but the jokes and hilarity came from the nurses and did not always extend to the patients. This pseudo-therapeutic culture is gradually disappearing as the nurses gain more confidence and experience in meeting the real needs of the patients under their care.

When initial enthusiasm began to wane, some senior medical and nursing personnel became discouraged and complained of failure in others without being aware of their own withdrawal from the project. Thus at a critical juncture when their continued drive and enthusiasm were most needed, it was least in evidence. As more hospital personnel (psychologists, social workers and occupational therapists) were drawn into ward activities and as the patients began spontaneously to assert themselves, the tide turned. The changes in ward policies became accepted features of the hospital and were no longer questioned or challenged. It remained necessary to restate from time to time the aims and purposes of the therapeutic community. There was a constant trend toward making things pleasant for the patients rather than the fostering of purposeful activities which might lead to maturation in behavior.

There is now, however, a greater understanding of the functions of the hospital and a greater sense of participation and collaboration among both nurse and patient groups. The importance given to the treatment roles of nurses and attendants has been an important factor in stimulating them to greater personal effort. Their accomplishments have further increased their sense of security and have made it possible for them to go beyond their traditional roles.

SUMMARY

"There is nothing more painful to human nature than the pain of a new idea." (Bagehot)

Problems encountered in the development of a therapeutic community on a psychiatric ward have been described. Increased demands are made on all members of the community including the patients. The physician is exposed to criticism at patient meetings and may feel threatened by the freer and more sophisticated expression of opinion by the nursing staff. The nurse has less opportunity to isolate herself from the patients by preoccupation with administration or ritualistic nursing routines more suited to the needs of a general hospital. She must be more flexible, less dependent on regulations, and above all she must be willing to enter into a more significant therapeutic relationship with her patients. The patients are expected to accept greater responsibility and to play a less passive role in the hospital social structure.

These changes in roles do not come easily to persons accumtomed to conventional nursing and medical attitudes. The greater participation of nurses and attendants in the treatment situation at first creates tension within these groups. Progress will be slow, and immediate goals should be realistic. Continued enthusiasm and drive are required to override the wave of discouragement and pessimism which follow the inevitable setbacks during the early stages of transition.

As each person gains a clear understanding of his role, there is gradual acceptance of this role. As the social structure of the ward changes, new cultural attitudes are formed which facilitate acceptance of these attitudes by new members of the community.

We are indebted to Dr. Herbert S. Gaskill, Director of Psychiatric Services, University of Colorado School of Medicine, and Dr. James A. V. Galvin, Medical Director of Colorado Psychopathic Hospital, for their leadership in the work described in the paper.

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THE SYNDROME OF OLIGOTHYMIA (PSYCHOPATHY)

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Orientation

In 1944 I introduced the concept of the *final common path* of the *total personality* (4) which was identified as *affectivity* to be used as a uniform approach—unbiased by the question of etiology—in the study of psychiatric disorders. The approach carries with it a developmental angle and, therefore, appears particularly suitable in application to conditions which develop after birth, if not earlier, or which develop at least since early life. Toward this end one could think of so-called *psychopathy* which is the well-expressed case loses its beginnings in the dawn of ontogenesis. The question what constitutes psychopathy has still to be answered. In the process of answering the question, at least mentioning of salient points in the course of the development of our concept of psychopathy is indicated. However, before doing so it will not be amiss to mention the outstanding clinical manifestations of so-called psychopathy. Karpman (11) described in detail the clinical picture as it may be observed during various periods of life of the psychopath, such as his cruelty and incorrigibility during childhood, his precocity and delinquency at about puberty, and his maladjustment to major challenges of life—work, love, and social obligations—during adolescence and adult life. It will not be amiss further to emphasize the following symptomatology: savage cruelty, lack of sympathy for others, impulsiveness, setting of false goals, inability to learn by experience, demanding of service from others and giving nothing in return, rebellion against authority, and antisocial activity of all kind; intelligence as a rule is good; and there are no gross physical and neurological findings.

With the foregoing in mind we shall follow up the condition on *descriptive*, and *neuro-* and *psychodynamic* lines, as given by representative studies on the subject.

Regarding the *descriptive* level, there is evidence that already Pinel, Esquirol, and others appreciated the existence of individuals later known as psychopaths. It was, however, Prichard (19) who described the condition in 1835 under the headings of "moral insanity" and "moral imbecility", noting that the patient had good intelligence (morality obviously referring in a broad sense to affectivity). In 1888 Koch (14) introduced the term of "psychopathic inferiority" which was labelled later by Adolf Meyer in this country "constitutional inferiority" (both terms obviously inadequate, but as shall be seen later the term "constitutional" is from a certain angle not without merit). The condition eventually became known as *psychopathic personality*. Kraepelin described a number of clinical variations of the condition, such as the *excitable*, the *impulsive*, etc. Following this tradition other writers have enumerated about 16 variants of psychopathy, adding to the Kraepelinian forms such types as the *hysterical*, the *compulsive*, the *schizoid*, etc. obviously including psychoneurotics and borderline psychotics (who showed psychopathic traits), which render the concept useless. Still, headway was being made, and here and there sparks of greater insight were expressed. Attention is called to the work of Birnbaum (1). He emphasized that *pathological affectivity* was the most marked trait of the psychopathic personality. Birnbaum compared the psychopath with the oligophren and observed that the psychopath may have a defect in intelligence and that the oligophren may have psychopathic traits. Furthermore, Birnbaum (1) pointed out that there was no parallelism between *psychopathy* and *criminality*. Regretfully, little attention has been given to the work of Birnbaum as the review of the literature testifies. In summing up, one may say that no particular advance has been made on the descriptive level. Perhaps the definition of psychopathy given by Darling (3) in recent years confirms it. He concludes that psychopathic personality is a mental disease which develops before or after puberty and is caused by inherited predisposition, or by psychic or somatic factors, or both. The condition is characterized by deviation in the social, moral, sexual and emotional field without intellectual

impairment, neurosis, or psychosis, with lack of ability to learn by experience (in criticism one may say that the definition is not very consistent, not in line with modern psychiatric semantics, and is of little value for progress).

We shall now look into the *neurodynamic* aspects of psychopathy. Maudsley (16) in 1896 noted that psychopathic behavior may be associated with organic brain disease such as *dementia paralytica*. According to other observations psychopathic behavior may be the result of trauma to the frontal lobes. Similar behavior is known to occur as sequelae of *encephalitis lethargica*. Hypoglycemic states are known to influence behavior toward antisocial conduct, etc. Still we cannot equate psychopathic behavior with structural changes of the brain in all instances. In this direction encephalographic studies have not only contributed a good deal toward insight but may be expected to produce still greater appreciation of the condition, if not actually serving as a bridge between physio- and psychopathology. It must be understood, however, that while the EEG is mirroring some cerebral activity, it is not pathognomic for a definite process. Still, the presence of an abnormal electroencephalogram is suggestive of a good probability of deviation of behavior. Moreover, while we do not know of the exact origin and nature of the bioelectric phenomenon reflected by the EEG, it has been established that it signifies a fundamental biological rhythm expressed by the neurons. The rhythm is individual, and even uniovular twins do not have quite the same rhythm. The latter represents variations in the state of excitation of the neurons. Consequently, one may see the variations in the light of variations of clinical manifestations of behavior. Attention is called to the fact that electricity is also produced secondary to loss of energy due to conduction of nerve impulses, as well as due to the maintenance of the state of central excitation; thus, reflecting on the vicious cycle of psychophysiological aspects of behavior. With the foregoing in mind I would like to quote the following works:

Knott and Gottlieb (15) summarize their studies with the hypothesis that the abnormality evident in the electroencephalogram of the psychopath is either due to illness or injury in childhood which caused changes in function of the cerebral tissue.

Silverman (21) concludes that psychopathy is a mental illness resulting from inborn or early acquired cerebral dysfunction and disturbed parent-child relationship.

More specific data are given by the following authors:

Hill (8) observes that the posterior temporal slow wave focus has seemed the most malignant in its clinical associations. These individuals have shown the greatest immaturity, the most severe anti-social behavior, and often the most dangerous aggressiveness.

Hodge (9) concludes on the basis of his psychiatric and electrophysiologic studies that one observes in the psychopath a lack of development of adequate cortico-thalamic association patterns which he believes are arrested at the age of the end of the latency period and the beginning of the homosexual phase in childhood. The conclusion is based on the findings of a persistent *theta* rhythm in 29 out of 78 cases, a resting *delta* rhythm in 5 cases, and in 28 other cases the normal resting record has shown a *delta* rhythm after hyperpnea.

Chorynak (2) offers another interesting theory. He believes that the psychopath suffered organic damage to the *angular* and *supramarginal gyri* with the result of maldevelopment of body *schemata*. This in turn results in an inability on the part of the individual to form positive identifications with *ego*-ideals since such identifications require a completely developed *body-image* by the person. Chorynak believes that the cause of it is *anoxemia*.

We arrive now at the *psychodynamic* level. One may say in a general way that the clinical manifestations of psychopathy fall dynamically in the triad of: lack of guilt-feelings, abnormal aggressiveness and narcissistic self-evaluation. Psychoanalytically, guilt-feelings may be interpreted as an expression of tension between "internalized" aggression and the *ego*. Internalized aggression leads to the setting up of the *super-ego*. Aggression is internalized by the child, as if, in exchange for giving up of the child's drives for his parents' love. Consider then, if the parent is hostile or if the child feels rejected, etc., no exchange or compensation will take place; aggression will not be internalized and be free-floating as in the psychopath. The described situation will also reflect on the

development of the child's object relationship; in the case of the psychopath contributing to his narcissistic self-evaluation (this in addition to the suggested relationship of the development of the *body-image* to identification and *ego* development). According to Wittels (22) the psychopath is often the only child or has been the only child for a long time; this would be contributory to the development of a need for self-glorification. Again, Wittels believes that the psychopath is a bisexual individual who accepts his bisexuality and therefore has no guilt-feelings.

The greatest contribution toward understanding of the psychopath dynamically was made by Karpman (11–12). This author divides psychopathy into two groups: a) the *primary*, with subdivision in aggressive-predatory and passive-parasitic, and b) the *secondary* psychopathy. In the primary cases, according to Karpman, no emotional factors can be found. The secondary cases are virtually psychoneuroses. Karpman gives a few pertinent psychodynamic trends in the primary cases. I like to emphasize the following which meet with my experience: 1) a remarkably simple emotional organization, 2) phantasy and dream-life very primitive, lacking in symbolic expression as compared with the neurotic, 3) sex-life parallels his life pattern in general, lacking control and aiming at self-gratification, 4) lack of guilt-feeling, 5) no distance between stimulus and response, 6) intelligence normal or above, but details show a great many irregularities.

The Rorshach test which does not contribute anything decisive shows as observed by Heuser (7) no conflict over conduct, poor emotional endowment, and poor control when aroused, which at the time of outburst is of psychotic character.

Next, the following clinical material illustrates a few cardinal traits of the subject.

Clinical Material

Case 1: Patient's certification was caused by continued disturbed behavior and threats to kill his mother. His record reveals the following pertinent data:

Father was of Italian extraction, born in New York City; he was a product of a "broken home" and was a serious behavior problem from early life. While in the fifth grade he was "thrown out" of school. His working record was poor; and he was a chronic alcoholic. He died of a brain tumor.

Mother was of Jewish background, one of 17 children and is said to have had an extremely unhappy childhood. Her parents died when she was 14, following which she went to live with an aunt; later she ran away. She had a child at 19 by an unknown father, and when the baby was three months old, went to live with the father of the patient. They never married. She remained with him until his death in spite of the fact that he was very cruel to her. She had another child by the man; this offspring—a girl—was also a problem child.

The patient was born in New York City on September 10, 1934. He was a sickly baby and was losing weight. At 1½ he had a convulsion but none since; at 4 had an operation for hernia; and before entering school had "pneumonia" several times. He began school at 6, and when in the second grade he began to show difficult behavior, he was placed in an ungraded class; later was sent to a special school where he "raised the devil". He was placed in a state training school. At the age of 12 he was apprehended with another boy riding in a stolen car. While in training school he was found to have an I.Q. of 78. He refused to conform, was involved in fights, but upon insistence of his mother was released. He was, however, shortly returned because he was found again riding in a stolen car. Upon return his conduct became still worse. He threatened staff members and was aggressive toward other boys. He was returned to Court with the recommendation "to be placed in an institution of stronger control"; this was done. He remained there for about a year and then was released to the care of his mother at the age of 17. Psychosexual development was not known except of having a strong ambivalent attitude toward mother. He was a chronic masturbater; was involved in sex-play with other boys. No heterosexual contacts.

After his release from the institution he continued unchanged, was idle, restless, began to indulge in alcohol, became threatening to mother and, therefore, was sent to the City observation ward. From here he was certified to the State hospital at the age of 18.

In the hospital he was found to be in good general physical condition. Routine laboratory tests were negative.

EEG was abnormal. It showed a poorly organized dysrhythmic pattern of slow and paroxysmal fast activity with paroxysmal response to hyperventilation; the latter involving the temporal lobes chiefly.

Other laboratory tests showed low blood sugar; hematology and urine negative. X-ray of skull and chest negative. Blood Wassermann negative. Mentally, described as ambulatory, relaxed, dull, and shallow emotionally; denied abnormal ideas. Orientation good; other tests of sensorium defective.

Psychologically, received an I.Q. of 86 (verbal 75, performance 101), considered dull-normal. Attention was called to the disparity of the verbal and nonverbal I.Q., pointing to particular difficulties in arithmetic and conceptual thinking. Bender-Gestalt test suggested a low energy level and aggressive traits. Figure drawing showed poor masculine identification. Rorschach test gave only 14 responses (rejected cards one and six). The test suggested sexual difficulty stemming partly from sexual confusion and partly from hostility

to mother and other female contemporaries. There was also evidence of strong dislike for male authority.

Patient had several trials on home visits and convalescent care periods which failed. During his last absence from the hospital he was arrested while taking part in a hold-up using a pistol. He was returned to the hospital. When he was considered able to stand trial, he was discharged to the Court at the age of 22.

Case 2: Patient's certification followed a mental examination as a result of being charged with burglary.

He was a young man, 22 years of age, single, no occupation, born in the U. S. of so-called mixed race. He was the only child of a father who was at the time of patient's admission 47 years old, a meek and passive individual, and of a mother, 40 years of age, active, obsessional and a domineering person, pressing the patient from early life for greater achievement. Our patient was an instrument delivery (no known damage), was breast fed, talked and walked early. Infancy was marked by strong attachment to mother. From the age of 5 to 12 he had "asthmatic" attacks during nights. When a physician would come, there would be no evidence of anything specific except forced breathing. He had the usual childhood diseases without apparent sequelae. His school record was good; he skipped classes in grade school; but in his third year of high school he lost interest in his studies and dropped out; ran away from home but returned. He was allowed to finish high school at night which he accomplished at 17. He had difficulty in obtaining work because of his age and had to fake his age. After he found employment, he did not apply himself well and at 18 joined the U. S. Armed Forces, becoming a paratrooper. He was discharged one year later for medical reasons (there was a return of his "asthmatic" attacks).

Following his discharge from the Army he could not adjust at all. On the day after discharge he was arrested for disorderly conduct, had several subsequent arrests for such anti-social activities as disorderly conduct, reckless driving, petty larceny and finally burglary. About six months before hospitalization and his last arrest for burglary, he began to use *heroin* (the need of money to purchase drugs prompted his participation in burglary). There was a previous admission to a Veterans Hospital "in order to get out of a court case". While there he was noted as "a very bright young man who appeared sexually and socially retarded by a prolonged adolescent rebellion characterized by dislike of authority, masturbation guilt, dependency-independency conflict, and a tendency to overemphasize his sexual prowess". He was described further as being "always on the go", restless and unstable particularly with reference to the opposite sex, poorly adapted to work with an increased instability and irritability after his Army service.

In the hospital patient was noted in good general physical condition. He was 6 ft., 1 in. in height, and 175 lbs. in weight. Routine laboratory tests negative.

EEG showed *alpha* varied from 7.5 to 10 cycles per second. Normal amplitude. There was one 4.5 cycles per second. Symmetrical fronto-occipital burst. After hyperventilation the wave forms became disorganized in the symmetrical temporal lead.

Mentally, he was noted in good contact but reserved, somewhat depressive and self-absorbed. There were no abnormal ideas or particular emotional abnormalities observed. He made an excellent hospital adjustment. Psychological tests described him as an "insecure, childishly dependent person. . . . His libidinous impulses being guilt-laden with fear of homosexuality." Further psychodynamic exploration produced the following. He spoke of his mother as adorable, loveable, etc. She was to him the "ideal woman and wife". He spoke of his father only casually and in conciliatory terms. The "asthmatic" attacks were symbolic for cravings for mother's care and fear of abandonment by her. The attacks subsided when he began to masturbate (masturbation here may be regarded as a defense and as a method to emancipate oneself from mother). His change of attitude in high school was due to the fact of a delay in development of pubic hair, and to lack of emission when masturbating; he was afraid of not developing into a man. This was one of the reasons for his joining the paratroopers in a heroic effort to prove his masculinity. For the same reason he was overindulging in sex relations. He tried homosexuality in the form of *fellatio*, and toyed with the idea of homosexual practice for material gain but was ashamed and afraid of it.

He adjusted well in the hospital, made good contact, and gained some insight into his condition. He was discharged to the Court as being able to make his defense after 14 months of hospital residence.

Comments and Conclusions

The foregoing account seems to offer considerable data on the subject, but is insufficient to form a clear definition of psychopathy. The available data do not give us the desired psychiatric insight into the problem, nor allow us to form an idea of adequate therapy. Perhaps a new line of approach will help, namely, to ask ourselves the question what is the *central fact* in psychopathy? If we could answer the question adequately, it would at least allow us to establish a clinical syndrome of psychopathy. This would be a proper starting point for the reason that a syndrome is the external exponent of changes going on in the total personality, which is inclusive of changes of both internal and external *milieu*. The former referring to *neuro-* and *psychodynamics*; the latter incorporating environmental factors of all kind. Before answering the question of what constitutes the *central fact* of psychopathy, I should like to comment briefly on certain views on the problem, as given in the part of orientation. To begin with the "constitutional" approach, it is obvious that no results could be expected from such an approach since the term is a cover-up for the unknown. However, considering the view of

Kahn (10) that constitution is composed of *impulse*, *temperament* and *character* (by no means covering the subject) and the idea that impulse and temperament are somatic and that character is psychical in nature, the approach gives us some hope for therapy since what may be psychical in nature, may be hoped to be subject to re-education.

Regarding the concept of "psychopathic inferiority", suffice to say that the component parts of the term are even semantically incompatible.

Concerning the approach of Karpman which divides psychopathy into *primary* and *secondary*, the most attractive aspect of the approach to me is the fact that it tends to isolate a syndrome of psychopathy which is also my aim, as stated. However, I cannot accept the terms in full, first, because of the claim made that *primary* psychopathy excludes completely emotional factors in its etiology, and secondly, for other reasons which arise from my own formulation, as shall be seen presently (note that the quoted case 1 which would fall in the category of primary psychopathy evidenced an unresolved Oedipal situation).

Concerning the current classification of psychopathy as established by the American Psychiatric Association (5), the attitude has shown important progress by way of approaching the problem from a developmental angle which apparently resulted in isolation of the group of *personality pattern reactions*, such as the *inadequate personality* from the labyrinth of "psychopathy". However, the other differentiated groups still offer confusion. Moreover, the use of the term *sociopathic* in lieu of *psychopathic* is obviously of little value since the term is descriptive, pointing to one aspect of the problem only, whereas the term psychopathic is meaningful when seen from the angle of telencephalization of functions of the total organism (6).

Concerning other causative factors, *heredity* deserves some comment. According to Rosanoff (20) and others psychopathy develops in monozygotic twins in the proportion from 67.6 to 100 per cent, which is obviously significant. Of other works regarding causation of psychopathy I like to refer to Maughs (17) who followed up in a very consistent manner the literature on psychopathy. This author states that there is an increasing amount of evidence that the causation of psychopathy is to be found in a combination of organic and environmental factors.

I shall now attempt to answer the set question what constitutes the *central fact* of psychopathy. It is interesting to note that already Prichard made reference to "morality" which may be regarded as referring to affective aspects of the problem. Birnbaum decidedly spoke of "pathological affectivity" of the psychopath. The Rorschach test points to: "poor emotional endowment" of the psychopath, and to the fact that the acute outburst is psychotic in character. Any clinical description of psychopathy emphasizes emotional states, such as cruelty, lack of sympathy for others, etc., which in summary makes me regard *affectivity* as the *central fact* of psychopathy. On the other hand, since we pursue the subject on developmental lines, I note that *affectivity* is the coordinating mechanism of the totality, the *final common path* of the total personality. Here, it becomes necessary to elaborate somewhat on the nature of affectivity. One may assume from an evolutionary biological view that affectivity evolves from the original irritability of the cell which one may in turn call the "mental" component of the cell. Thus, affectivity forms the background and soil of sensibility of the cell in all its nascent nuances. On the same grounds one may say that affectivity will measure the bodily power to absorb and reflect stimuli. Emotions are regarded as the motor end of affectivity. In accordance with the principle of telencephalization (6) affectivity will go along in its integration with the integration of the central nervous system and will be projected upon the brain (think of the central mechanism of emotion as presented by Papez (18)). One may speak of "thalamic" and "cortical" affectivity. The former is intense, widespread and overflowing into the motor sphere. Since it is trigger-like in action, its manifestations clinically are being interpreted as impulsive, or as "acted-out". On the other hand, "cortical" affectivity will be discriminatory, guided by selectivity and manifested in *choice* and *refusal*. "Thalamic" affectivity in the adult will signify primitivity or defectiveness of

function, as seen in psychopathy. Defectiveness of affectivity may also be spoken of as of "poverty" of affectivity. I consider such *poverty* of *affectivity* to be the *central fact* of psychopathy. Accordingly, I like to label the condition, for want of a better term, OLIGOTHYMIA. The question arises what might be the cause of such poverty of affectivity? Is the condition an original endowment of the individual, or is the defect caused by incidences in the course of growth of the function? In the latter case we would be interested to know what the nature of such incidents might be. While we do not know of the exact causes of the said defectiveness, the following reasoning may be admitted for consideration of further research. First, note that psychopathy sets in, in well-established clinical cases, either very early in life or in the pre-pubertal phase of development. Secondly, I like to call attention to the state of intelligence of the psychopath. While as a rule the psychopath is considered of average or of better than average intelligence, this is not actually the case in all instances. As Karpman observes there are quite a few irregularities about the intelligence of the psychopath, which I believe may be seen particularly in hospitalized cases. Such irregularities of intelligence may develop as a consequence of traumatic experiences of all kinds, psychical or physical, or both. The closer such traumatic influences will be to birth, the greater the defect, as exemplified in the presented case 1. The closer the onset to birth, hereditary influences might be the greater factors. In either case, I believe a vulnerability of the cortico-thalamic organization may be suspected. Further comment presently.

The outlined formulation appears to have some *neurodynamic* corroboration, as reflected by the EEG. Reference is made to the posterior temporal slow wave, as discussed by Hill, which reflects on what I called "thalamic" affectivity. Considering the central mechanism of emotion as given by Papez which includes the hippocampus (this area being instrumental in summation of excitation), we can appreciate certain aspects of other dysrythmias observed in OLIGOTHYMIA.

Psychodynamics seem to fall in line with the foregoing interpretation. Reference is made to the well-pronounced case which demonstrates expression of crude affectivity which seeks only self-gratification. It would seem that such an individual operates on a very low level, almost on the level of the *pain-pleasure* phase of development. Consequently, there will be no guilt-feelings, no need for interpersonal communication, no need for other basic affective needs of an average mature individual. The contrast to the latter is what marks the OLIGOTHYM.

One may now attempt to establish a clinical syndrome of OLIGOTHYMIA. I propose that the syndrome consists on the *descriptive* level, which also expresses *psychodynamics*, of symptoms which fall into the triad of: lack of guilt-feelings, abnormal aggressiveness, and narcissistic self-evaluation which in turn represent an elaboration of the *central fact* of psychopathy; and of symptoms on the *neurodynamic* level as mirrored by the EEG in the form of either *theta* waves or other *dysrhythmias*. Violent expression of affectivity, even in the absence of dysrythmia but with other symptoms present, is considered an equivalent.

It would seem that the account of the *neuro-* and *psychodynamics* offers clues for further investigation, as may be deduced from the following, even if speculative, attempt at correlation of clinical data. Take a well-crystallized case of OLIGOTHYMIA in its severest form (I have discussed elsewhere that a condition is frequently best understood at its height of expression) in which case we shall have *theta* waves in the EEG. Since *theta* waves occur early in life between the ages of 2 and 5 (note that such waves may also appear later in life under certain provocations, but in such instances the rest of the clinical syndrome of psychopathy will be lacking), one may expect manifestations of "thalamic" affectivity which is usually the case. Other *dysrhythmias* in conjunction with the rest of the clinical formula of psychopathy will be most frequently demonstrated in cases of later onset at about pre-puberty, and will offer evidence of personality difficulties as may arise from difficulties in passing the *latency* and *homosexual* phases of development, as emphasized by Hodge. Moreover, one suspects in agreement with Hodge that there will exist a cortico-thalamic dysfunction. In such cases the

syndrome will be more moderately expressed affectivity may be somewhat better organized, there may be additional psychoneurotic, features, etc. The quoted case 1 suggests multiple causative factors of many varieties mentioned. Particular attention is called to the several attacks of "pneumonia" before the age of 6 that he suffered. It is suggestive that we may deal here, as well as in similar cases, with instances of subclinical forms of encephalitis due to infectious diseases of childhood. Etiological factors in the quoted case 2 would fall chiefly in the environmental field.

Attention is now called to the significance of the growth of a clinical symptom and syndrome, a somewhat neglected topic in research. Perhaps a good example for the evaluation of the growth of a symptom is the clinical manifestations of the projection mechanisms of which we know somewhat more than of any other mental mechanism. We are aware of the usage of the mechanism in the business of everyday life. We also know of its height of expression in paranoia. In some cases of the latter disorder we can follow up the stages of introspection which lead to ideas of reference, persecution, and finally grandeur. However, not every case has the resources to elaborate that far. There are cases of lesser intensity of expression of the disorder which are labelled paranoid condition. I propose to follow the same principle with regard to OLIGOTHYMIA. The latter term should be applied to cases which express the full clinical formula, as described at its height of expression. Cases of lesser intensity should be labelled OLIGOTHYMOID CONDITION.

Continuing the comparison of oligothymia with paranoia, it seems also possible to compare the conditions with regard to therapy. At the present state of our knowledge there is no definite cure for either disorder. However, the oligothymoid conditions, as well as the paranoid condition, may be favorably influenced by psychotherapy and its adjuncts, as examplified by case 2.

One more aspect of the problem requires some comment; I mean the so-called term of "Psychosis with Psychopathic Personality". According to our state hospital practice, the term is used with a qualifying phrase of "paranoid-hallucinatory episode", or "episode of emotional instability", etc. I reviewed a number of such cases and found that those who remained in the hospital for an indefinite period of time had to be re-diagnosed as cases of schizophrenia. Those who have been released after an apparent recovery have shown upon re-admission a full-blown syndrome of schizophrenia, which suggested that the first episode was in reality an abortive attack of schizophrenia. I agree, therefore, with Karpman (13) who concludes that the diagnosis of Psychosis with Psychopathic Personality is untenable.

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THE ANATOMY OF RIGIDITY AND TREMOR

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The three most widely studied types of rigidity are those of spasticity in hemiplegia, Parkinson's disease as he originally described it, and the post-encephalitic Parkinsonism of sleepy-sickness. All are due to blocking of the extrapyramidal suppressor pathways between the cortex and the cord, leaving the augmentor system more or less intact. These three syndromes, indeed, represent suppressor deficit in relatively pure form. The three sites of damage are, in the same order, the internal capsule, the globus pallidus, and its henchman the substantia nigra.

Working from below upward, the lowest site of damage is the substantia nigra, which in post-encephalitic Parkinsonism may be affected to such a degree that practically its every nerve-cell is destroyed, the black pigment, previously intracellular, lying dispersed among the supporting neuroglial cells. The globus pallidus is sometimes normal.

Of the two symptoms most characteristic of Parkinsonism in all its forms, namely muscular rigidity and muscular tremor, the rigidity is the more prominent in post-encephalitics. The reverse is the case in a true Parkinson, in which the globus pallidus is the seat of attack.

Paralysis agitans or true Parkinson's disease differs therefore from the post-encephalitic type in the relative balance of tremor and rigidity; it is tremor which is so prominent in the true Parkinson, rigidity in the post-encephalitic. It is here if anywhere that an understanding must be reached on the anatomical basis of rigidity and tremor.

The difference in the relative balance between rigidity and tremor must be due to the difference in the target-areas of the disease process: rigidity is maximal in the post-encephalitic when the substantia nigra is affected; tremor is maximal in the true Parkinson when the globus pallidus is damaged. Tremor, it has been reasoned (2), is due to damage of the augmentor system. The globus pallidus, however, is suppressor.

The threatened *volte face* of the argument may be forestalled by a closer scrutiny of the fine-structure or microanatomy of the four basal ganglia chiefly concerned, namely the substantia nigra, the globus pallidus, the putamen and the caudate nucleus. The joining of globus pallidus and putamen as the lenticular nucleus is an anatomical accident. The division between paleo-striatum and neo-striatum is cardinal in every approach to the subject.

There are two types of cell, large and small, in the three upper nuclei which collectively form the corpus striatum. The large cells (the "pallidal system" of Ramsay Hunt) are mostly in the paleo-striatum, but they occur also in the neo-striatum; they resemble the motor cells of the spinal anterior horn, and from their size it may be inferred that their axones are long and large. These axones emerge as the ansa lenticularis which is the main, if not the only, outlet from the globus pallidus. It is those large cells which are diseased in paralysis agitans.

The small cells are mostly in the neo-striatum, and their small axones end in the globus pallidus only, around the cell-bodies of the pallidal system. The neo-striatal cells, therefore, have no other outlet than through the globus pallidus and its ansa lenticularis. These small cells are diseased in chorea.

From a study of the cells as seen in section of the normal human brain, and of the symptoms of disease when these cells are destroyed, a formulation may be constructed which will account reasonably well for the known facts. The large paleo-striatal cells of the globus pallidus are suppressor in function, and they relay at the large pigmented cells of the substantia nigra. The small neo-striatal cells control, suppress or inhibit the outflow of the large cells of the paleo-striatum, and therefore they must belong to the augmentor system. This repeats the structural pattern of the red nucleus, where the large cells of the paleo-rubrum are suppressor, the small cells of the neo-rubrum are possibly augmentor.

The small cells of the neo-striatum are contained by the large cells below them. They

cannot make any contact with the outside world except through enemy territory. Any damage to the paleo-striatal cells of the suppressor system inflicts, in effect, a corresponding amount of damage on the neo-striatal or augmentor system. The reverse, however, is not necessarily true. Furthermore, although the augmentor cells of the neo-striatum are contained by the suppressor cells of the globus pallidus, this does not apply to the suppressor cells in the substantia nigra; for once free of the ansa (the outlet of the globus pallidus) the two systems separate.

Owing to the admixture of large and small cells in all the upper nuclei, no matter what the disease both systems are affected, and the resultant syndrome depends upon the relative balance of undamaged plus and minus. The large (suppressor) cells, however, are densest at the lower end, while the small (augmentor) cells are densest above.

The three type-diseases which have been studied are chorea (perpetual motion) at one end, post-encephalitis (perpetual rigidity) at the other, and paralysis agitans (rigidity plus tremor) in between. The target-nuclei for the three diseases, in the order named, are the neo-striatum above, the substantia nigra below, and the globus pallidus in between.

Chorea of childhood affects only the small, augmentor cells of the neo-striatum, leaving the large, suppressor cells probably unaffected. There are thus no rigidity and no paralysis, merely perpetual motion in pure form. Post-encephalitis affects the substantia nigra, the relay of the suppressor system, without much damage to the augmentor cells; rigidity hence is sometimes extreme, and tremor may be absent.

Paralysis agitans affects the globus pallidus and thus damages both systems, the suppressor cells directly, the augmentor cells by cutting them off from their outlet. Damage to the suppressor cells causes rigidity, but the rigidity is not extreme because the augmentor cells, although free and unopposed, are themselves blocked. Damage to the augmentor outflow releases tremor, a low-grade and purposeless form of perpetual motion. Rigidity and tremor thus play Box and Cox with each other at their every appearance because of the mutual incompatibility between perpetual rigidity and perpetual motion.

The hypothesis that tremor is due to augmentor (facilitatory) deficit has been confirmed experimentally. Ward, McCulloch and Magoun (4) produced in monkeys tremor-at-rest "by lesions lying entirely below the basal ganglia in the tegmentum of the brain stem. These lesions are paramedian and ventral in position in the midbrain, and laterally and rather dorsally placed in the pons. Stimulation of the reticular formation at both these levels gives rise to impulses that descend over reticulospinal fibers and facilitate existing movement."

Human material has yielded further evidence. A stereotactic apparatus similar to the Horsley-Clarke instrument has been used to coagulate by needle-electrode various parts of the basal ganglia. Coagulation of the inner segment of the pallidum has relieved hyperkinetic movements in a number of patients. Stimulation of certain thalamic nuclei has altered the rhythm of Parkinsonian tremor, and coagulation there resulted in improvement of the tremor and disappearance of rigidity (1). Tremor and hyperkinesis, which are caused by lesions of augmentor cells, are relieved by destruction of suppressor cells.

In these three diseases, the third member of the trinity of control, the pyramidal system, is undamaged. When this is blocked, in the internal capsule, the spasticity of hemiplegia appears in place of the rigidity of Parkinson, athetosis in place of tremor (3). The site of the suppressor block, also, is different: in the one case (spasticity-athetosis) in the internal capsule, in the other (rigidity-tremor) in the paleo-striatum. The conversion of the first to the second member of each bracketed pair is due to the same cause, namely a lessening of the suppressor deficit, an alteration of the augmentor-suppressor balance in favor of suppression.

The anomalous functions of the subthalamus, as yet so little understood, may perhaps be related to the same sequence: electrical stimulation of its low-threshold suppressor cells (in the cat) releases natural walking, the augmentor cells remaining unaffected (or the walking would no longer be natural); hemorrhage equally destructive of augmentor and

suppressor cells (in the human) is the cause of the violent and one-sided chorea known as hemiballismus. The first condition (natural or unobstructed movement) differs from the second (disorganized or partially obstructed movement) and from the complete obstruction of movement in spasticity, in the relative balance of augmentation and suppression; this is increasingly to the advantage of augmentation (obstruction) or to the disadvantage of suppression, in the several instances—which is in the same sense as in the foregoing paragraph. The confusion that arises from the word "facilitatory" is evident: cells of the augmentor system facilitate or increase the tonus of individual muscles, but the resultant spasticity leads to obstruction of movement—the very opposite of facilitation.

These relations subsisting between the various clinical states and diseases of the human are foreshadowed in the relation of the spinal dog to its prototype the ever-swimming fish. The major cause of obstruction to natural movement which was encountered by the pioneers of life on dry land was the force of gravity, a force to which the water-borne fish is almost a stranger. The augmentor system is Nature's response to the challenge of gravity. In the amphibia it is poorly developed: a frog can jump but it cannot stand, it squats or flops when at rest; the newts and salamanders crawl sluggishly and keep their bellies on the ground for most of the time. When the salamander-like axolotl wishes to hurry, it has to wriggle bellywise on the ground, as though swimming on land, with the legs barely touching the ground; quadripedal walking with the body properly supported is a slow and deliberate movement, unhurried because the animal has not the necessary sustained strength of limb. It is the lizards who run so agilely, although structurally and to the unlearned they are almost indistinguishable from the salamanders; they do this running by lifting their bodies well clear of the ground: they have faced the challenge of gravity, though to physiology their achievement is a terrain yet to be explored.

The effect of gravity on the augmentor system of the decerebrate dog is well known. When lifted off the ground the augmentor system is put out of action, and the dog can mark time in perpetual motion; this is frozen once more to perpetual rigidity when the animal is set on its feet to support its whole weight. Even at this level, then, the conversion of perpetual motion (unobstructed movement) to perpetual rigidity is brought about by the alteration of the augmentor-suppressor balance to the advantage of augmentation.

Owing to the intimate relation between the augmentor and suppressor cells in the striatum it is not surprising that direct electrical stimulation should give results which are not always easy to interpret. There is evidence that stimulation of the caudate gives rise to suppression, and possibly this may be due to direct action on the large-celled and therefore low-threshold pallidal system which freely invades it from below. The caudate is undoubtedly an important relay-station for many of the suppressor circuits in transit from cortex to thalamus. Neither of these observations, however, is incompatible with the view that the primary neo-striatal function is inhibitory or decremental to the paleo-striatal suppressor system. Certainly no clinician who has followed his human cases *usque ad mortem* and beyond will doubt that the substantia nigra and the globus pallidus, when damaged, release rigidity and therefore suppress it during life, and that the putamen and the caudate oppose the two lower nuclei and must therefore be augmentor.

Certain discrepancies in the evidence from human clinical and simian experimental material may be accounted for by the fact that the agent of the former is natural disease which selectively attacks physiological systems, whereas the latter can affect only anatomical sites regardless of the balance of plus and minus in their intimate texture. The threshold of the suppressor system appears to be much lower than that of the augmentor, and therefore suppressor effects may predominate in many sites, such as the caudate nucleus, which are primarily augmentor. On the other hand, suppressor effects (on electrical stimulation) are demonstrable only in the presence of pre-existing tonus or movement, and may therefore be masked by augmentor

effects which are able to exist in their own right.

The complexities of the upper levels of the augmentor and suppressor systems are still in part unresolved. In the reticular formations and the reticulo-spinal tracts there are two separate and independent systems, and not merely a single tract conveying both suppressor and augmentor impulses. In the striatum, they exchange their independence for the closest dependence, and the two opponents are in series instead of in parallel. The suppressor system, however, at this level has a choice of alternative or parallel paths, through either the internal capsule or the paleo-striatum, which may suffer hurt independently of each other with the appearance of correspondingly different clinical diseases.

Summary

The clinical features of disease of the basal ganglia are interpreted in terms of augmentor and suppressor nuclei. The paleo-striatum is suppressor and when damaged releases the perpetual rigidity of Parkinsonism. The neostriatum is augmentor and when damaged releases the perpetual motion of chorea. The difference between post-encephalitic and true Parkinsonism is explained in anatomical terms.

The contrast between perpetual motion (tremor, chorea) and perpetual rigidity appears in the decerebrate dog; when lifted off the ground, the augmentor system (the stretch reflex) is put out of action, and perpetual rigidity yields place to perpetual motion of the mark-time reflex.

An explanation is suggested of certain discrepancies between experimental neurophysiology and the conclusions of clinical, human pathology.

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MORAL TREATMENT IN AMERICAN PSYCHIATRY

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I. Mental Hospitals: The Problem of Fulfilling Their Purpose

What is a mental hospital? Is it a permanent home for the insane and no different from what used to be called an insane asylum? Is it a place where people go for operations or medicines which cure certain kinds of illnesses? Or is it a place where people go to talk with psychiatrists about disturbing personal problems? There is a currently growing volume of literature, both fiction and non-fiction, which seeks to elucidate the problems of individual failure and unhappiness by presenting them as understandable and solvable in terms of modern dynamic psychiatry. Science news reporters, on the other hand, have kept the average citizen up to date on the development of wonder drugs or other medical and surgical treatments which cure mental disorders.

It may well appear to the average citizen that there are many indications that medical science has already conquered or is very near conquering mental illness, but he also knows that from time to time the public press has a great deal to say about bad conditions in mental hospitals. The massive collection of brick buildings, isolated from the rest of the community, several miles from town is still an unknown entity to him. The sheer size and number of the buildings demonstrate that large numbers of people have to be kept locked up. This fact is difficult to reconcile with the indications that modern psychiatry knows how to cure mental illness. It serves to intensify the feeling of dread which has always been associated with the word asylum.

The typical mental hospital as it exists in America today can be better understood if described and discussed in much the same terms that one would use in telling about a place such as a resort hotel, a naval vessel, a military post or a university where he had lived for a period of time.

It is not inaccurate to say that the typical mental hospital impresses a visitor approaching its grounds as having something of the appealing quality of the typical college campus, with the exception that there are almost no people passing to and fro on the walks. The Administration Building, in particular, differs little from that of a college. Its interior has an appearance of good taste and dignity, but again it is strangely quiet, and surprisingly few people are in evidence.

It is not until one enters the wards where the patients live that one feels the impact of what it means to be a patient in a typical mental hospital. Contrary to one's expectations, ward after ward may be passed through without witnessing the violent, the grotesque, or the ridiculous. Instead, one absorbs the heavy atmosphere of hundreds of people doing nothing and showing interest in nothing. Endless lines of people sit on benches along the walls. Some have their eyes closed; others gaze fixedly at the floor or the opposite wall.

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Occasionally, a head is turned to look out a window or to watch someone coming back from the toilet to take his place on a bench. All and all, it is an innocuous scene characterized by inertness, listlessness, docility and utter hopelessness. Not so bad as might have been expected, one may think. Of course, there are worse wards where people lie on the floor naked and attendants are kept busy mopping up human excreta. Then there are those intrepid ones who approach the visitor and plead pathetically for him to intercede in their behalf to help them get out of the hospital. And then, again someone may pace the floor who mutters to himself and thereby breaks the monotony. Or there may be a sudden chill of excitement when someone breaks into angry shouting for no apparent reason at all.

The visitor may well feel restless and irritated by the apathy of the patients and their willingness to waste these hours of their lives in meaningless tedium. His irritation may lead to his asking questions. If so, he learns that the attendant is proud of the ward because it is quiet and no mishaps have occurred while he was on duty; because the floor is clean; because the patients are prompt and orderly in going to and from meals. The visitor finds that the scene which appalls him with the emptiness and pointlessness of human life is regarded by the attendant as good behavior on the part of the patients. This opinion, voiced by the attendant, introduces the visitor to the outlook of institutional psychiatry as it is practiced today. He may well be puzzled at their outlook, for there is little indication that it has anything to do with the psychiatry of current popular literature with its accent on hope and its accounts of enriching human life and showing the way to individual happiness. He must strain his imagination to see how the surrender of actually thousands of people to abject despair and inertia could possibly represent an improvement in their mental condition. On the contrary, he can envision himself going out of his mind if forced to spend many days in such a setting.

The more intimately acquainted a visitor becomes with the mental hospital, the sooner he reaches the final realization that it is engaged solely in the business of providing the physical needs and preserving the physical health and safety of rudderless, despairing people. He may come to admire the efficiency with which the basic operations of feeding, clothing, bathing and laundering are performed. But he will wonder at the absence not only of treatment in the psychiatric sense but of any regimen whatsoever that the average layman would regard as conducive to mental health. He will learn that every patient is examined by a physician and given a psychiatric diagnosis. He will also learn that some newly admitted patients receive electric shock. But he cannot escape the overwhelming fact that patients numbered in the thousands receive no treatment for their mental disorders.

If the visitor talks with the physician and asks questions, he may be told that no treatment has yet been discovered which will cure the vast majority of the patients. Another physician trained in modern dynamic psychiatry may tell him that most of the patients could be treated with psychotherapy but that there are no psychotherapists available. Still another may tell him that one-third to one-half of the patients no longer need to be in the hospital because their illness has subsided. They remain in the hospital, he says, because there is no place for them to go and no one will give them a job. The superintendent will more than likely tell him that the hospital is crowded with more patients than it was built to care for, and that the hospital is badly understaffed and in need of many more attendants, nurses, social workers and psychiatrists than the State budget provides or can be expected to provide. The visitor is then given to understand from the superintendent that the hospital as it is does not meet the needs of the patients, but the superintendent may also tell him that everything is being done for the patients that can be done in the way of cure of their mental illnesses.

The visitor can see for himself that the facts, as they stand, clearly indicate that the patients are dealt with by the hospital personnel on a collective mass basis and not as individuals. The patients are moved like an army from their sleeping quarters to their sitting places, to their eating places and back to their sitting places. Movement occurs only in connection with getting out of bed, eating, and going back to bed.

There are some exceptions, for a number of

patients do work in the various service centers of the hospitals such as the kitchen and the laundry. Others may work on the hospital farm or on the hospital grounds. There may be other patients who are allowed out of doors to take a walk in the fresh air. And there may be a select few patients who go to the occupational therapy department, where they are taught to make something with their hands. But even those patients, who do more than spend their days sitting, show by their expressionless faces and reluctance to speak that they have become accustomed to loneliness.

From observation of the great mass of patients, the visitor cannot help but be impressed with their obedience and conformity to the wishes of the hospital authorities. "But why," he may ask, "would the authorities wish the patients to lead an inactive, uncommunicative, lonely existence?" The answer he finds is that it is necessary to prevent the patients from exciting one another and creating an unmanageable bedlam. The hospital authorities regard their chief objective to be protection of the patient from insane acts harmful to himself or others. All hospital personnel who come into contact with patients are taught to be constantly on the lookout for impending mishaps. They must also be on the alert to prevent the patients from getting hold of any article which might conceivably be used as a tool of destruction. Matches are not allowed, for a patient might set himself afire. Patients are not allowed to shave themselves lest they hide razor blades with which to cut their throats. Belts are not allowed lest patients hang themselves. Checker games are not allowed lest the patients attempt to swallow the checkers and choke. Every effort is made to prevent the recurrence of any dangerous act committed by any patient at any time in the past, and to anticipate any new way of committing one which might be invented in the future. (This might seem to rest on the theory that removal of all opportunity or occasion for insane acts or insane talk will eventually break the patient of insane habits and behavior.) The patients are handled as though their insanity were entirely due to an internal disorder and had nothing to do with the effects of external events on their emotions. Abuse of patients by personnel is strictly forbidden for obvious human reasons and not because it is thought that abuse has any effect on their illness.

There is total absence within the domain of the typical mental hospital of opportunity to participate in or give attention to any of the activities with which the members of any free community occupy themselves in some form or another. Patients have neither the materials nor the freedom of movement to develop their talents or acquire skills, nor to have the experiences of ordinary life. They have nothing in their current lives to exchange with one another, either in the realm of material objects or of observations, which is not a tedious repetition of something that is already known to all. There is also total absence of application of any of the principles of mental hygiene in the day to day program of living in the hospital. There is no work; there is no play; there is no program of living.

The forced non-participation in human affairs of the mentally ill would necessarily seem to be based on certain knowledge that the mentally ill are wholly lacking in social intelligence, are totally incapable of perceiving the rights of others and are completely unable to learn to be members of society. The extreme caution exercised in the control of patients must be based on some such assumptions. These asumptions are, of course, in accord with the concept that mental illnesses are malignant, irradicable diseases which totally destroy the capacity of the individual to behave like a human being or to be a person in any sense of the word.

One who visits the typical mental hospital will not find, however, that the hospital staff holds such a concept of mental illness. On the contrary, he will find that small scale endeavors are made to provide the patients with entertainments and recreational opportunities which recognize their sensibilities as persons. He will learn that the extreme caution and the stringent restrictions placed on the vast majority of the patients are practical necessities resulting from the limited resources of the hospital in terms of personnel and facilities with which to meet the needs of the huge number of patients. The hospital has, in short, barely sufficient resources to discharge the minimal responsibility of preserving the patients from physical injury.

The visitor may detect an enigma in the relation of the hospital to its source of financial support—the citizenry at large—which arises from a serious misunderstanding. The citizenry assumes that the medical specialists in diseases of the mind who operate the public mental hospitals know that the wretched poverty of normal life activities in the hospital is an inevitable consequence of the diseased mind. The medical directors of the hospital, on the other hand, assume that the citizenry is not interested in giving money or time to provide mentally ill patients with a fuller, busier, more worthwhile life. They regard public disinterest in the happiness and welfare of the mentally ill as inevitable, while the public regard their expert opinion to be that the degraded living conditions of patients are an inevitable result of mental disease which cannot be corrected. The result of this impasse and misunderstanding is that patients are seriously demoralized by the disrespect they suffer in being compelled to live sub-human lives. Indeed, it is difficult to find an example of members of lower species being compelled to suffer the indignity of functioning so far beneath their own level.

Changes which facilitate return of the mentally ill to normal life

The foregoing account of the mental hospital as it is today refers to many of the conditions of life, in the hospital which prevent patients from taking part in practically all the activities engaged in by other people. Removal of these negative conditions constitutes a first and vitally important step toward raising the mental hospital to a level where it can perform the function for which it exists, namely, that of restoring the capacity of its patients to resume life outside the hospital.

The most damaging "negative condition" of the mental hospital is that which derives from what may fittingly be called the "closed door" policy. This policy not only locks patients in and confines them to a seat on a bench, but it also locks out the mentally well members of society whose participation in hospital life can bring the interests and healthful breath of normality of the outside community into the hospital. The mingling of outsiders with patients not only does away with the deteriorating effects of monotony, but it raises patients to their rightful status as human beings by actual demonstration that they are recognized as worthy of being the associates of citizens in good standing.

The mental hospital that welcomes outsiders within its walls and publicizes the need of its patients for normal human contact has made an important step toward raising its standards of care. Outsiders who become volunteer workers soon recognize the multitudinous needs of patients and communicate them to the rest of the community. Sooner or later there is a flow of good into the hospital in the form of books, magazines, playing cards, checkers, bingo games, sewing materials, pictures, clothing, hot plates, coffee percolators, tea pots, radios, phonographs and pianos. Besides material goods, outsiders will give time as instructors in such activities as dancing, sewing and cooking.

As outsiders become better acquainted with the patients, they come to develop a personal interest in particular individual patients whom they take on shopping trips and invite to their homes.

Outsiders who become active volunteers become motivated to organize as a society which can raise funds for the benefit of patients.

The activities of volunteers in conjunction with patients lead to a great increase in the comings and goings in and out of wards. Increase in traffic, in turn, leads to the discovery that locked doors are not only inconvenient but unnecessary. Patients who would ordinarily try to escape become more interested in the new activities than in running away. Along with the unlocking of doors comes a relaxation of other restrictions and rules which become not only too difficult to administer in a setting of activity, but also unnecessary.

As patients regain contact with the community through their new friends, they not only learn of opportunities for jobs, but experience the advantage of being introduced to a prospective employer by a volunteer.

Adoption of an "open-door" policy is presented as the first step toward raising the standards of care in a mental hospital. Equally important is the adoption of what might be called a policy of self-examination on the part

of the administrative staff of the hospital in the interests of learning how the effectiveness of hospital personnel is impeded by traditional functioning as a dictatorship. Serious thought must be given to the advantages to be gained from democratic procedures which facilitate communication from below to above and make the knowledge and experience of those in top positions accessible to those dealing directly with patients. Freedom of expression and participation in policy determination by attendants stimulates their initiative and paves the way for the formation of patient organizations, such as patient government. The inclusion of patient organizations as responsible bodies having a role in the administrative affairs of the hospital is a powerful stimulus in motivating patients to acquire those social and political skills which are indispensable to successful living in the community.

The central theme of mental hospital improvement is removal of barriers to the development of all the positive assets of the mentally ill and provision not only of the maximum possible degree of freedom but also of access to whatever means facilitate their becoming more useful citizens. The improvement of the mental hospital requires what is essentially a social revolution in the management of the mentally ill, for it involves casting off those antiquated asylum methods which were dictated by the ignorance and prejudices of the past and are perpetuated to the present by fear and misunderstanding.

Recent developments in the treatment of the mentally ill which impose minimal obstructions to the patient's participation in society are the establishment of clinics for the treatment of psychoses on an out-patient basis, the establishment of psychiatric wards in general hospitals, and the increase in the number of psychiatrists in private practice who treat patients in their offices.

The purpose of this essay is to give an account of what human endeavor in America has done and can be expected to do toward relief of the severe grades of mental illness which require individuals to be held in mental hospitals. The remaining chapters seek to give accounts of three phases in American psychiatry. The first tells of the understanding care which our society sought to give the mentally ill when democracy was young and inspired with its mission to mankind. The second is an account of the decline in human understanding which accompanied social changes during the course of the nineteenth century, and the damage it has done Americans who have suffered nervous breakdowns. The third tells of the new hope which modern understanding of human thought, feeling, and behavior has for present-day and future victims of nervous breakdowns.

At the present time, the American people are faced with the responsibility of learning what modern psychiatry has to offer the mentally ill and how to bring its benefits to them. Americans have not as yet been fully informed of the most significant aspect of modern scientific knowledge of the hospitalized mentally ill—namely their great need *for psychological aid and moral support which all people in distress need and which our society is already able to give if it is motivated to do so.* Scientific controversy within psychiatry over the validity of particular psychological theories and techniques still obscures from public view the great importance of bringing ordinary psychological and material aids to the mentally ill who are deprived of all contacts in our mental hospitals as they are now constituted.

The condition of the institutionalized mentally ill in America today is a matter of particular interest in this age of experts and specialists in that it can be scrutinized as a result of public opinion being led to adopt and retain a point of view which contradicts the primary value of the individual and harms many citizens. The sobering aspect of the present harmful public attitude toward mental illness is that it was formed under the influence of supposedly scientific authority which pronounced mental illness incurable over three-quarters of a century ago.

The enormous number of man-years of wasted living which attends present day institutional management of the mentally ill is a matter of great importance not only to psychiatrists but also to those citizens who by their participation in social and political activities of the community exercise an influence on the manner of operation of both private and public institutions which effect the general welfare.

II. Moral Treatment—Forgotten Success in History of Psychiatry

Backsliding has time and again followed progress in man's understanding of self and neighbor. Periods of enlightenment at times left an imprint strong enough to survive generations of darkness and inspire progress anew. At other times, the principle on which these periods were based had to be rediscovered. On the whole, progress over the centuries has been substantial. Religion, politics and science have all made their contributions.

The greatest challenge to the capacity of men (individually and collectively) to understand neighbor and self arises when mental illness disrupts their relationship to one another. Society's reaction to the mentally ill has oscillated throughout recorded history between brutality and benevolence. When neither was extreme, pernicious neglect was the rule.

A basis for understanding human behavior was laid by Plato, who wrote, "And indeed it may almost be asserted that all intemperance in any kind of pleasure, *and all disgraceful conduct*, is not properly blamed as the consequence of voluntary guilt. For no one is voluntarily bad; but he who is depraved becomes so through a certain habit of body, and an ill-governed education. All the vicious are vicious through two most involuntary causes, which we shall always ascribe to the planters, than to the things planted, and to the trainers than to those trained" (6).

Hippocrates declared the behavior in psychoses to be due to brain disease and decried belief in demon possession.

These elements of understanding were lost to mankind for several hundred years only to reappear in the writings of *Coelius Aurelianus* and again disappear during the Dark Ages. They were once more brought to light by *Paracelsus* and *John Weyer* in the sixteenth century. They raised their voices against abuses arising from superstition and warped theological interpretation of the symtoms of mental illness. Their influence resulted in partial acceptance of mental disorder as a province of medicine. Consistent humanitarian care and scientific clinical study were not adopted until the eighteenth century. The liberal philosophy and political movements of this century contained the hope that science would enable the achievement of humanitarian ends. The possibility that science could solve the riddle of mental illness captured the imagination. In this endeavor, the goals of science and humanitarianism were undistinguishable. There was no clear-cut dividing line indicating where elimination of abuse ended and scientific therapy began.

Indeed, the humanistic science of the eighteenth century could not interpret human behavior in other than humanitarian terms. The very method of science involved clearing the mind of *a priori* bias in order that it might uncover universal laws. The assumption that laws of science as yet undiscovered were universal in the sense that the "law" of falling bodies was universal carried with it the connotation that human behavior, too, was the result of laws. Hence, human behavior must be influenced greatly by unknown forces over which the individual could not have complete control. This had the effect of emphasizing those qualities which individuals have in common and the impossibility of an absolute standard of individual responsibility. Logically then, from this point of view, all men could be looked upon as equal and forgivable for their evil actions. Democratic government and humanitarian treatment of criminals, paupers and psychotics thus appeared to have their foundations in science.

Humanitarianism favored the view that lunatics had undergone stresses which robbed them of their reason. That such stress could result from disappointment as well as inflammation was a basic assumption. Stresses of a psychological nature were referred to as *moral causes*. Treatment was called *moral treatment*, which meant that the patient was made comfortable, his interest aroused, his friendship invited, and discussion of his troubles encouraged. His time was managed and filled with purposeful activity.

The use of the word "moral" in the terms *moral causes* and *moral treatment* has, at first glance, the capacity to arouse animosity in the well-informed modern who is acquainted with that literature of anthropology and social psychology which demonstrates the relativity of moral standards. Knowledge that the early psychiatrist used the word moral as the

equivalent of emotional or psychological serves to allay such animosity. Deeper reflection on the genesis and meaning of the word "moral" discloses the logic of the usage. The term "moral" is intimately related to the word "morale" and carries within it emotional connotations of the words, zeal, hope, spirit and confidence. It also has to do with custom, conduct, way of life and inner meaning. The word moral (and the word ethics, too) has many shades of meaning with respect to interpersonal relations, besides having to do with abstract ideas, right and wrong and good and evil.

The word "moral" in *moral treatment* and *moral causes* bears within it an implication also about moral responsibility; namely, that the mentally ill were not morally responsible for their acts which were assumed to result either from ignorance or incorrect understanding. Indeed, to its founders, moral treatment of the mentally ill was considered to be a moral mandate on those who were more fortunate. Moral treatment was never clearly defined, possibly because its meaning was self-evident during the era in which it was used. In the context of that era it meant compassionate and understanding treatment of innocent sufferers. Indeed even innocence was not a prerequisite to meriting compassion. Compassion was also extended to those whose mental illness was thought due to willful and excessive indulgence in the passions.

Moral treatment is of great significance in the history of psychiatry not only because it was the first practical effort made to provide systematic and responsible care for an appreciable number of the mentally ill; it was also eminently successful in achieving recoveries.

The great step to moral treatment was taken almost simultaneously by a French physician and an English Quaker in the last decade of the eighteenth century. Phillipe Pinel transformed a madhouse into a hospital, and William Tuke built a *retreat* for the mentally ill. Similar reforms were wrought in Italy, Germany and America by Chiarurgi, Reil, and Rush. Man was not only reaching a new height in his understanding, but he was applying it on a wider front than ever before. Pinel has special priority on the debt the world owes for moral treatment.

The reforms of Benjamin Rush in America, though not as extensive as those of Pinel, were based on inspiration derived from the same source. Both were steeped in the liberal writings of the physician-philosopher John Locke. Rush's great influence did much to stimulate the interest of American physicians in mental illness and paved the way for full acceptance of the principles of moral treatment.

Although the mentally ill had for many years been accepted as patients in several hospitals in America (namely, the Pennsylvania Hospital, the New York Hospital, the Eastern State Hospital at Williamsburg, Virginia, and the Maryland Hospital at Baltimore), it was not until 1817, four years after Rush's death, that a hospital was founded in America expressly for the purpose of providing moral treatment. This hospital, patterned after the York Retreat in England, was built by Pennsylvania Quakers and named the Friends' Asylum. Within seven years, three more privately endowed mental hospitals were built: McLean, Bloomingdale, and the Hartford Retreat. Within thirty years, eighteen hospitals had been built for moral treatment of the mentally ill in America.

The high standards of hospitals built by private philanthropy set a good example for the many state-supported institutions which soon came into being. First of these was the Eastern State Hospital at Lexington, Kentucky, built in 1824, the same year as the Hartford Retreat in Connecticut. Within ten more years, four more state hospitals were built, now known as the Manhattan State Hospital (New York), 1825; the Western State Hospital (Staunton, Virginia), 1828; the South Carolina State Hospital (Columbia), 1828; and the Worcester State Hospital (Massachusetts), 1833.

The Worcester State Hospital merits special attention not only because of its prominence in present day psychiatry, but also because of the role it played in the history of moral treatment. The first superintendent at Worcester was Dr. Samuel B. Woodward, who, with Dr. Eli Todd, had persuaded the Connecticut Medical Society to sponsor the founding of the Hartford Retreat. These two physicians were

long standing friends who, in the course of their practice of general medicine, shared an abiding interest in the treatment of mental disorders. Both became "specialists" of their day; at least patients with mental diseases were referred to them by other physicians.

These pioneer psychiatrists conducted a survey of mental illness in Connecticut to determine the size of hospital necessary to care for the mentally ill of that state. The elder of the two, Dr. Todd, was appointed superintendent of the Retreat. Nine years later, Dr. Woodward was chosen superintendent of the hospital at Worcester, the first state institution for the mentally ill in New England. This hospital was built largely through the enthusiastic support of Horace Mann, father of the American public school. It might be mentioned in passing that the New Hampshire State Hospital was founded largely through the efforts of Dr. Luther Bell (who later became superintendent of McLean Hospital) and the clergymen of New Hampshire. These are but a few examples of the active support which professional men—clergymen, educators, physicians—gave in behalf of the mentally ill in the early history of American psychiatry.

Worcester State Hospital under the direction of Dr. Woodward served as a proving ground for moral treatment and demonstrated beyond doubt that recovery was the rule! Year after year Dr. Woodward gave the statistics of recovery in the Annual Reports of his hospital.

It was Dr. Todd, however, who first called the attention of the public to the success of moral treatment. He reported recovery in over 90% of patients who had been admitted to the Hartford Retreat with mental illness of less duration than one year. This result was based on relatively few admissions, however, and it remained for Dr. Woodward to demonstrate, on the basis of a large series of cases, that recovery was the rule in recently ill patients.

It is pertinent at this point to present the statistics of the Worcester Hospital during the time moral treatment was still applicable, that is before crowding and expansion beyond optimum size fully disrupted vital interpersonal relationships among patients, attendants and physicians.

Table 1 shows the number and per cent discharged recovered and improved of the total number of patients admitted who had been ill less than one year prior to their admission. During the entire 20 years there were 2,267 such admissions, of whom 1,618 were discharged as recovered or improved, or 71% (66% recovered, 5% improved). During this same period the total of all admissions (including those whose illness had lasted longer than one year prior to admission) was 4,119, of whom 2,439 or 59% were discharged recovered or improved (45% recovered, 14% improved).

TABLE 1.—Outcome in Patients Admitted to Worcester State Hospital Ill Less Than One Year Prior to Admission, 1833–1852*

Five-Year Period	Number Admitted	Number Discharged *Recovered*	Per Cent Discharged Recovered	Number Discharged Improved	Per Cent Discharged Improved
1833–37	300	211	70	39	8.3
1838–42	434	324	74.6	14	3.2
1843–47	742	474	63.9	34	4.6
1848–52	791	485	61.3	37	4.7

* Data for table were derived from the Annual Reports of the Worcester State Hospital.

Such statistical data cannot be ignored. They at least invite attention to the assumptions on which the idea of moral treatment was based and its cultural setting. America in the 1830's and '40's was rapidly developing a new liberal philosophy of the individual. Leading American thinkers of the period turned to nature in search of truth. Societies were formed for the abolition of slavery. Experiments were made in communal living. A spirit of freedom and self-expression was in the air. New England Puritanism was growing milder. The jealous God of Cotton Mather was becoming the loving God of William Channing, and a new intellectual independence was coming to the fore. Emerson encouraged the individual to self-reliance, and in one of his addresses, "The Scholar," he stated, "The world is nothing, the man is all." Historically, in the United States, this period has been referred to by Fisher as "The Rise of the Common Man, 1820–1850".

American thought was at this time in close communion with the romantic movement in Germany. American psychiatry was influenced by the then current psycho-biological trend in German psychiatric literature. In particular, the now forgotten name of Von Feuchtersleben was often referred to by American psychia-

trists. Indeed his contributions to psychiatric thought have only recently been recognized in modern times by Dr. Gregory Zilboorg who credits Feuchtersleben's view of mental illness in the 1840's as being much the same as that of present-day psychiatry.

One of the leading spokesmen of early American psychiatry was Dr. Isaac Ray, whose psychiatric career began in the 1830's as superintendent of the Augusta State (Maine) Hospital. Dr. Ray subscribed to the view that the mind includes those qualities which make possible those relations among people which have to do with man's greatest welfare. Love and hate were to him as much manifestations of mind as rational processes. He also contended that every appetite and faculty must have its means of gratification and protested that belief to the contrary was wholly repugnant. He believed in the unity of the individual man and referred specifically to the unity of mind and brain. In his book "Mental Hygiene" (1863) he gave particular attention to the influence of passions, emotions, and temperament on mental health. He strongly recommended, after Von Feuchtersleben, that ill-humored individuals be regarded as suffering from disease and advised them to seek every means to rid themselves of it to prevent becoming insane. He also held the view that insanity is but an exaggeration of personality traits which in their less extreme form are regarded as merely disagreeable.

Both Dr. Ray and his colleague, Dr. John S. Butler, superintendent of the Hartford Retreat (Connecticut), were impressed with the importance of child rearing to mental health. Indeed, Dr. Butler categorically stated that he had traced the cause of insanity to the malign influences of childhood in a large proportion of over 3,000 patients he had personally studied. Dr. Butler also voiced a commonly held opinion of the times that all bodily processes are under the influence of the mind.

The psychodynamic and psychosomatic orientation of psychiatry in the early 1800's found its fullest expression in the elaboration of the psychological therapeutic approach known as the moral treatment of insanity. In the language of Dr. Ray, the proper administration of moral treatment required that the physician learn through inquiry and conversation what occupies the minds of his patients. It required further that he investigate the mental make-up of patients' relatives. The greatest requirement of all was that the physician spare no effort in gaining the confidence and good will of his patients and strive to discover their experiences and supply their needs. The recommendation was made that the physician acquire a large fund of knowledge in order to converse with patients on matters interesting to them and thus gain an understanding of their inner life. The physician was strongly reminded that even the most insane patients are sensitive to manifestations of interest and good will. He was warned, however, to limit the number of patients in his care to those he can know personally.

Although much emphasis was placed on the relationship between physician and patient, moral treatment embraced a much larger psychological approach than individual psychotherapy. Indeed, perhaps the greatest asset of moral treatment was the attention it gave to the value of physical setting and social influences of hospital life as curative agents. In his book "Curability of Insanity" (1887) (7) the forementioned Dr. Butler repeatedly pointed out the importance of scrutinizing the hospital environment to find and remove whatever is depressing or disturbing. He insisted that a cheerful, sympathetic atmosphere and esthetic appeal are essential for the cure of many patients. His goal was to make hospital wards as homelike as possible, for he placed great faith in the value of family-like gatherings in which patients could discuss their problems among themselves and with the physician. He also believed that confidential interviews with patients were essential, but he was convinced that the turning point in many a patient's illness took place in group discussions. He also insisted that appropriate social influences could not be maintained if hospitals were allowed to care for more than 200 patients at one time. He considered monotony to be the greatest obstacle to be overcome in mental hospitals and believed heartily in promoting a wide variety of activities for patients.

The theoretical foundation of early American psychiatry and the success of its therapeutic approach to insane individuals as

persons were a source of inspiration to those who believed in the dignity of man and sought to improve his condition. Horace Mann and Charles Dickens were particularly impressed by the experience of seeing moral treatment in action. In his 1833 report (16), as chairman of the board of trustees of the Worcester State Hospital, Horace Mann told a moving story of 32 fellow beings who had been restored to their reason under the influences of the hospital whose loss to their families would otherwise have been mourned without hope. He told further of the unbelievable changes which had taken place in those patients who had not recovered. When the hospital was first opened, there were at least one hundred patients who would assail any human being who came near them. In less than a year only 12 of these patients were still assaultive. Similarly, of 40 patients who would tear off their clothing in the beginning, only eight still did so at the time of the report. He commented on the civility and kindness which had come to prevail among the patients. Wailing, raving, and desponding were dispelled, and the facial expression of patients reflected their improved state of mind. He credited these heartening results to the efforts "of all those engaged in administering the daily affairs of the institution to exclude, as far as in any manner possible, all causes of mental disquietude, by substituting persuasion by force, by practicing forebearance, mildness, and all the nameless offices of humanity, by imbuing in every practicable way, the minds of the patients with a new set of pleasing, cheerful, grateful and benevolent emotions." He summed up the idea of moral treatment in the following words: "In fine, the whole scheme of moral treatment is embraced in a single idea—humanity—the law of love—that sympathy which appropriates another's consciousness of pain and makes it a personal relief from suffering whenever another's sufferings are relieved."

Charles Dickens' account (9) of his visit to the Boston State Hospital in 1842 brings to light still more facets of hospital life in the moral treatment era. He commented on the wide variety of activities available to patients including carriage rides in the open air, fishing, and gardening and several kinds of indoor and outdoor games. Patients worked with sharp-edged tools and ate their meals with knives and forks. The patients organized themselves in a sewing circle which held meetings and passed resolutions. They also attended dances which were held weekly. Dickens was particularly surprised with the self-respect which was inculcated and encouraged in the patients by the superintendent's attitude toward them. He made special note that the superintendent and his family dined with the patients and mixed among them as a matter of course.

The psychological orientation of moral treatment and the recoveries from psychoses accompanying its application cannot be lightly dismissed. Modern psychiatry would do well to regard the mental hospitals of the early nineteenth century as pilot hospitals which demonstrated the value of social and psychological factors in treatment. The reason this finding was largely disregarded for nearly one hundred years is a story in itself. The least we can do is borrow a leaf from our psychiatric forefathers and give full attention to the possibilities of treating psychoses by social and psychological means in the many state and federal hospitals which have so long considered psychosis curable *only* by physical or chemical means.

III. The Breakdown of Moral Treatment

It is of great importance to the understanding of forces with which modern psychiatry must contend to determine why moral treatment did not become an enduring basic principle of psychiatric care rather than a soon forgotten temporary success. A successful technique in whatever field of endeavor is not ordinarily abandoned unless displaced by a still more effective technique. Moral treatment, however, simply passed out of existence. It was followed by nothing more than the void of custodial care.

Of the many factors which contributed to the decline and the eventual discard of moral treatment, lack of inspired leadership after the death of its innovators was probably the most important. The founders of moral treatment were shortsighted in not providing for their own successors in adequate numbers to meet the needs of the future. These leaders each trained but one or two physicians—not enough

to replace themselves and staff their own growing hospitals, let alone the numerous ones soon to be built. As a result, by the time of the Civil War, moral treatment was already crippled by the deaths of the leading moral therapists. Dr. Eli Todd died in 1833; Dr. Woodward resigned from the Worcester State Hospital in 1845 and died in 1850. Dr. Amariah Brigham, editor of the American Journal of Insanity, superintendent of the Utica State Hospital and one of the most vigorous writers on the subject of moral treatment, died in 1849. In the same year, Dr. Pliny Earle resigned from Bloomingdale presumably over a controversy involving the use of manual labor in his moral treatment program of wealthy patients. He did not reenter the field of moral treatment until 15 years later. Dr. Stedman resigned from tne Boston State Hospital in 1851. Dr. Luther Bell resigned his position as superintendent of McLean Hospital in 1856. Machinations in Ohio State politics forced Dr. William Awl to resign as superintendent of the Ohio State Hospital in 1850. Dr. John Galt died in 1862, and Nehemiah Cutler in 1859. In 1867, Dr. Isaac Ray resigned from the Butler Hospital, and five years later Dr. Butler resigned from the Hartford Retreat. In 1874, Dr. Stribling died.

Only four of the original 13 fathers of American psychiatry and founders of moral treatment survived the 1870's, and two of these had retired to private practice: Dr. Isaac Ray and Dr. John S. Butler. Dr. Pliny Earle continued as superintendent of the Northampton (Mass.) State Hospital until 1885, and Dr. Thomas Kirkbridge of the Pennsylvania Hospital until 1883. The former, although an avid proponent of moral treatment, was paradoxically one of the strongest forces in discrediting its results. Unfortunate events in his life in conjunction with a tendency to despondency and pessimism help explain the stand he took. These circumstances will be discussed in connection with statistical studies of treatment results in section IV.

Lack of foresight in training sufficient numbers of moral therapists for the future was matched by failure to plan ahead for the building of a sufficient number of hospitals. It is presumptuous of course to imply that such should be expected, for no one could have had any inkling of the impending rapid growth in population of the eastern seaboard and the accompanying shift from a rural to an urban mode of life which took place during the second half of the nineteenth century. It was not until 1874 that any particular mention was made of the great increase in the number of patients residing in the mental hospitals of Massachusetts. In the annual report of the State Board of Health of that year, Dr. Edward P. Jarvis, psychiatrist and recognized statistician, pointed out that all the state's mental hospitals had been enlarged to accommodate far more patients than the original plans allowed. Thirteen years later, Dr. John S. Butler in his forementioned book "Curability of Insanity" sought to influence the American Psychiatric Association to place a limit on the size of mental hospitals. He invoked the resolutions passed by that association in 1844 and 1851 which stated that the preferable maximum size for a mental hospital was two hundred patients. He decried the resolution passed in 1866 which allowed hospitals to have a capacity for six hundred patients and pointed out that it in effect placed no limit since hospitals had already expanded beyond that number. He quoted Drs. Isaac Ray and Thomas Kirkbridge and other surviving pioneers of moral treatment to the effect that large hospitals harmed patients by denying them personal attention and caused them to be treated like a mob in which they lost their human atrributes.

Needless to say, Dr. Butler and his colleagues were not needed. The average size of state hospitals reached 1,000 many decades ago and has now reached over 2,000 with no limit in sight. The Worcester State Hospital is an example of the steady increase in resident population of mental hospitals especially around the time of the Civil War (fig. 1). Recurrent cycles of overcrowding were first met by depriving patients of recreational space. With each addition of new construction for sleeping quarters, there was a still further relative decrease in the space and means for recreation, which in turn demanded an increase in impersonal regimentation of patients. The rapid increase in population which embarrassed and then made impossible the applica-

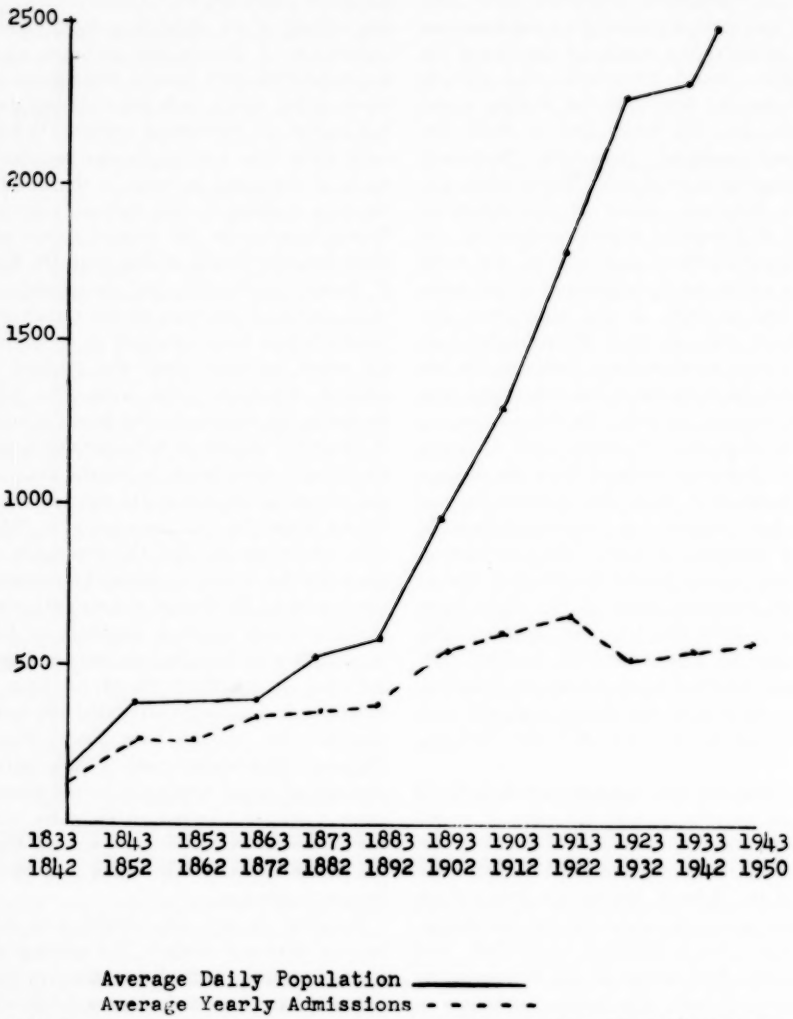

FIG. 1. Resident population and yearly admission rates of Worcester State Hospital, 1833–1950. Data for this graph were derived from the Annual Reports of the Worcester State Hospital.

tion of moral treatment included another factor of great importance, that of immigration, which began in the post-Civil War period. The influx of patients from poverty-stricken, immigrant families into the mental hospital put a severe strain on the flexibility and breadth of understanding of the medical officers of the hospitals. Psychiatrists of old American stock who were filled with compassion on beholding mental illness in one of their own were filled with revulsion by what they considered uncouth and ignorant in the insane foreign pauper. As the proportion of immigrant patients in the hospital increased, there was a tendency for hospital living quarters to deteriorate until they were nothing more than barren dormitories adjoining even more barren day-rooms whose furniture consisted of crude benches along the walls. The resulting apathy of the patients led their physicians to express the belief that they were in no way capable of appreciating anything better! This example

of rationalized callousness provides some idea of the degrading effect which compromise can produce when the dignity of the individual is forgotten.

Passages from the Annual Reports of the Worcester State Hospital leave little doubt that racial prejudice played a role in the breakdown not only of moral treatment but of ordinary decent hospital living standards. Mention of foreigners as a problem was first made in the Annual Report of 1854, in which the lament was made that the State Hospital was fast becoming a hospital for Irish immigrants rather than for the intelligent Yeomanry of Massachusetts who could pay their board and would not ask for charity. A special plea was made for the "classification" of patients by which was meant the segregation of foreigners from native New Englanders. The basis for the plea was that the sensibilities of patients reared in the proverbially neat and orderly households of New England were offended by close contact with those who were accustomed to and satisfied with filthy habitations and filthier habits.

Yankee physicians apparently found it difficult to identify with the Irish immigrant. Moral treatment and the "law of love" extolled by Horace Mann were reserved for those of Yankee stock. Indeed, in the Annual Report of 1858 (Worcester State Hospital) the Irish were castigated for a variety of reasons, among which were: receiving high wages in prosperous times, gratifying vicious indulgences, seeking labor in the most menial capacity, huddling together in the most objectionable places, neglecting all the rules of health, and last and worst of all preferring the solace of rum and tobacco to the quiet, intelligent influences of well-ordered homes.

"Foreign insane pauperism" was the name given to the problem of mental illness in the immigrant population. Its disrupting effects were due not only to racial and religious incompatibilities, but also to economic factors. Patients without settlement in Massachusetts were paid for by the Commonwealth. All other patients' bills were paid either by their families or by the towns in which they resided. The Commonwealth paid so little for its pauper patients that the hospital was forced to charge the towns and families more. In the Annual Report of the State Board of Health of 1874, Dr. Edward Jarvis pointed out that proportionately few of the mentally ill patients of self-sustaining families were sent to state hospitals but were kept at home due to inability to pay. Rapid population growth, immigration and pauperism forced the metamorphosis of mental hospitals from home-like havens of moral treatment to huge custodial asylums. Table 2 shows the proportion of foreign-born in each of the years indicated: if patients of foreign-born parents had been included, the proportion of what the trustees and superintendent of Worcester called foreigners would be much greater in the latter decades of the century.

TABLE 2.—Proportion of Foreign-Born among Patients Admitted to Worcester State Hospital, 1844–1933*

Year	No. Admissions	Foreign-Born
		%
1844†	236	10
1854†	288	38
1863†	215	47
1873†	470	38
1883†	275	?
1893†	534	67
1903‡	553	45
1913‡	515	46
1923‡	402	53
1933‡	484	45

* Data for this table were derived from the Annual Reports of the Worcester State Hospital.

† Proportion based on total admissions.

‡ Proportion based on first admissions.

Note: These particular foreign-born were usually destitute. Mental hospitals were becomming *vast almshouses*—just as today they are becoming "old folks homes".

As Dr. Jarvis pointed out, ability to pay greatly influenced the public use of the hospital—the poverty-stricken did *not hesitate*, while those who were self-sustaining, yet not rich, could not pay and were ashamed to "go on the town", so did not often use the hospitals. Figure 2, which compares the weekly cost at Worcester with weekly per capita income, shows just how much this factor must have operated at least prior to 1880.

The phenomenon of the mentally ill from *destitute* families crowding out and, in effect, preventing the hospitalization of mentally

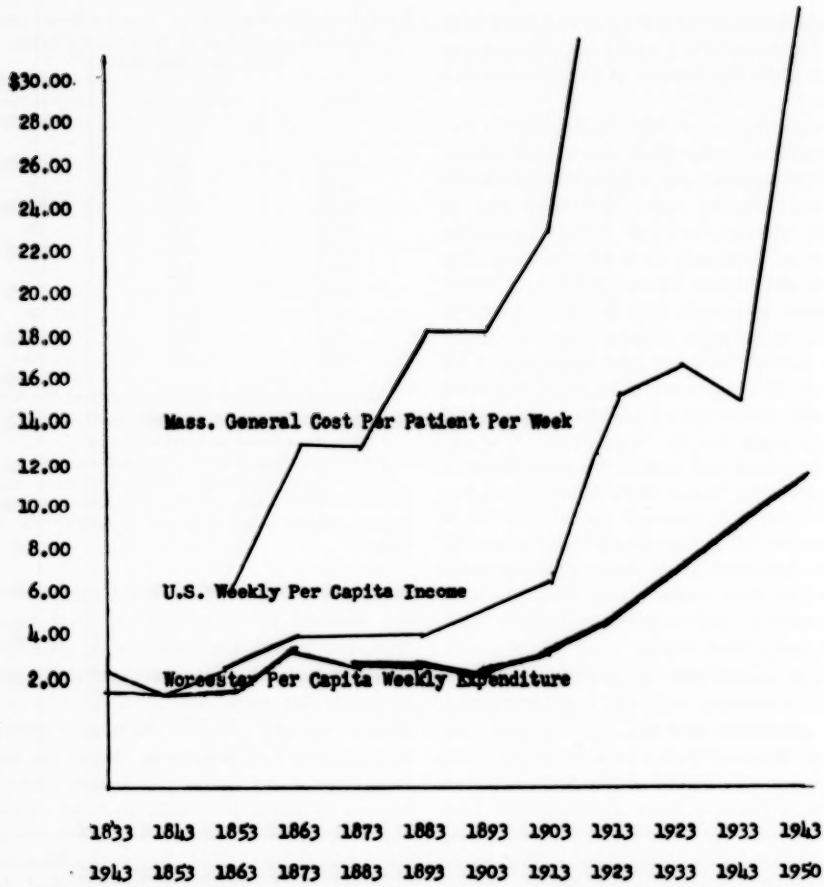

FIG. 2. Worcester State Hospital per capita weekly expenditure, and Massachusetts General Hospital per capita weekly expenditure, compared with United States per capita weekly income, 1833–1950.
Adapted from "The Hospital in Contemporary Life" (Edited by Nathaniel W. Faxon, M.D., Harvard University Press, Cambridge, 1949) and the Annual Reports of the Worcester State Hospital, 1833–1940.

ill from *self-sustaining* families led to further deterioration of mental hospitals. The attitude that paupers would not appreciate nice things anyway provided a rationalization for not insisting on higher standards. On the other hand, many *home recoveries* must have occurred among the mentally ill of "self-sustaining" families who could not afford hospital care. These were probably treated by private practitioners such as Edward P. Jarvis, William Hammond, and Silas Weir Mitchell.

The deterioration in mental hospital living standards through the latter part of the nineteenth century is shown graphically in Figure 2, in terms of a comparison of weekly per capita expenditures on patients at the Worcester State Hospital with the per capita income of the United States. In 1869 the weekly per capita income of the United States was $4.00. The weekly cost per patient at Worcester State Hospital was also $4.00. In 1899, the weekly per capita income of the United States had gone up to $5.00, and the weekly cost per patient at Worcester had *dropped to* $3.50. The Massachusetts General Hospital weekly cost per patient in 1869 was $10.00 and in 1899 was $14.00. The cost at Massachusetts General was, in 1869, two and

one-half times greater than at Worcester; in 1890, it was four times greater; and in 1929, it was six times greater, or $42.00 per week. Weekly per capita income of the United States by 1929 had gone up to $13.00, or more than tripled what it had been in 1869. Massachusetts General's weekly cost per patient had *quadrupled*, while Worcester's had *scarcely doubled* (from $4.00 to just under $7.00). The general hospital ran ahead of per capita income, while the metal hospital ran behind. To the public, the former was expensive and the latter cheap. Thus was mental illness given, in addition to the universal stigmas, a further one, "cheap" with its peculiarly American connotation.

Any criteria adopted for comparing standards of hospital care provided in different eras are fraught with error. Data with respect to the Worcester State Hospital allow construction of indices which may to a certain extent reflect changes in the standards of care during the last century.

The ratio of the number of resident patients per physician for each decade over a period of 100 years is an index of this change. Table 3 shows how the ratio increased over the entire period. Table 4 shows the ratio of the number of patients per each attendant by decades over the same period. Here a trend in the opposite direction is shown. From decade to decade each attendant had fewer patients in his charge.

In 1904, the 70-hour work week was adopted. From that time on some of the attendants worked night shifts; thus the ratio of patients per attendant at any given time may have been less than indicated in table 4 after that date. Prior to 1904, the attendants usually had quarters in the wards and were always with the patients except for a few hours each Saturday.

The relative decrease in the number of physicians and the relative increase in the number of attendants resulted in a large increase in the ratio of the number of attendants to each physician over the 110 years. In the decade 1913–22, the number of attendants to each physician was three times as great as in the decades 1833–42, and 1843–52 (table 5).

The scale of pay for physicians during the 1890's was more than double that of the 1830's and '40's (from $500 to $1,000 per year for assistant physicians and from $1,200 to $3,000 per year for superintendents) while the scale for attendants only increased about

TABLE 3.—Number of Resident Patients Per each Physician at Worcester State Hospital*

1833–1950

1833–1842	88
1843–1852	127
1853–1862	128
1863–1872	156
1873–1882	146
1883–1892	132
1893–1902	114
1903–1912	148
1913–1922	205
1923–1932	175
1933–1942	165
1943–1950	230

* Data for tables 3, 4, and 5 were derived from the Annual Reports of the Worcester State Hospital.

TABLE 4.—Number of Resident Patients Per each Attendant at Worcester State Hospital

1833–1950

1833–1842	12
1843–1852	15
1853–1862	—
1863–1872	—
1873–1882	—
1883–1892	8
1893–1902	11
1903–1912	10
1913–1922	9
1923–1932	9
1933–1942	7
1943–1950	11

TABLE 5.—Number of Attendants Per each Physician at Worcester State Hospital

1833–1950

1833–1842	8
1843–1852	8
1853–1862	—
1863–1872	—
1873–1882	—
1883–1892	13
1893–1902	11
1903–1912	15
1913–1922	24
1923–1932	20
1933–1942	24
1943–1950	21

fifty per cent (from $15 a month to $23–$25 a month.)

During the 1830's, there were, on the average, two doctors and 15 attendants at the Worcester State Hospital. During the 1930's, there were, on the average, 14 doctors and 336 attendants!

The standards of care given the patients in terms of personal relationships suffered in proportion to the increase in social distance between physicians and attendants. Opportunities for physicians and attendants to discuss problems of individual patients became fewer.

The retardation of research in mental hospitals and the deterioration of care given patients did not long continue unnoticed. By 1875, members of the rising specialty of neurology had formed their own society—a society which in its early years not only specifically excluded from membership physicians in the employ of mental hospitals, but openly challenged their authority to speak on matters of mental illness! In 1879, the first direct attack on mental hospitals and their medical officers was made by William A. Hammond in a paper, "The Non-Asylum Treatment of the Insane". The first two paragraphs indicate its tenor:

> "It is the commonly received opinion among physicians and the public generally that as soon as possible after an individual becomes insane, he or she must be placed under the restraint of a lunatic asylum. No matter what the type of mental aberration, no matter what the facilities for receiving care and attention at home, the asylum is regarded as the necessary destination of the one so unfortunate as to be deprived wholly, or in part, of the light of reason. For this state of affairs, the medical officers of insane asylums are mainly responsible, for they have very diligently inculcated the idea that they alone, by education, by experience and by general aptitude, are qualified to take the medical superintendence of the unfortunate class of patients in question, and that restraint and separation from friends and acquaintances are measures in themselves which are specially curative in their influence.
>
> "It will be among the chief objects of this memoir to show that these views are erroneous; that the medical profession (outside the hospital) is, as a body, fully as capable of treating cases of insanity as cases of any other disease, and that in many instances sequestration is not only unnecessary but positively injurious" (21).

In 1894, Dr. Weir Mitchell administered a verbal spanking to the members of the medico-psychological society on its fiftieth anniversary:

> "The cloistered lives you lead give rise, we think, to certain mental peculiarities. I could tell you how to mend them. I shall by and by. You hold to and teach certain opinions which we have long learned to lose. One is the superstition (almost is it that) to the effect that an asylum is in itself curative. You hear the regret in every report that patients are not sent soon enough, as if you had ways of curing which we have not. Upon my word, I think asylum life is deadly to the insane. Poverty, risk, fear, send you many patients; many more are sent by people quite able to have their friends treated outside. They are placed in asylums because of the wide-spread belief you have so long, as we think, so unreasonably fostered, to the effect that there is some mysterious therapeutic influence to be found behind your walls and locked doors. We hold the reverse opinion, and think your hospitals are never to be used save as a last resort" (24).

Tucker's report on "Lunacy in Many Lands", based on an extensive inspection tour of mental hospitals of the world, was published in 1887. Unbelievably bad hospital conditions were practically universal. It is a sad comment on the state of psychiatry that Tucker's chief plea was merely for decent standards of living for the mentally ill and elimination of mechanical restraint and enforced baths. Probably the most severe castigation of psychiatry was that Franklin B. Sanborn, who, as chairman of the Board of State Charities (Massachusetts) for 35 years, had become well acquainted with the medical officers of mental hospitals. In a pamphlet published in 1899 bearing the title "A Remonstrance in the Name of the Insane Poor Against Crowding them into Hospital Palaces or Asylum Prisons", intended for the eyes of members of the State Legislature, he made a strong plea. He not only questioned the ability of the medical officers to treat the mentally ill and cited poor recovery rates to prove his point, but he also gave account of an instance in which a capable nurse was obstructed from caring for patients although she had previously been successful in effecting the recovery of apparently hopeless cases. He contrasted this nurse with a hospital physician who, through medical ignorance, had caused the death of many insane women. Nine years later, in 1908, Clifford Beers published "A Mind That Found Itself", in which he described the abuses suffered by patients in mental hospitals. Among the letters received by Beers in re-

sponse to the manuscript of his book was one from William James, the last paragraph of which is as true today as when it was written in 1907.

"Nowhere is there massed together as much suffering as in the asylums. Nowhere is there so much sodden routine and fatalistic insensibility as in those who have to treat it. Nowhere is an ideal treatment more costly. The officials in charge grow resigned to the conditions under which they have to labor. They cannot plead their cause as an auxiliary organization can plead it for them. Public opinion is too glad to remain ignorant. As mediator between officials, patients, and the public conscience, a society such as you sketch is absolutely required and the sooner it gets under way the better. Sincerely yours, William James" (22).

The "sodden routine and fatalistic insensibility" to which James refers is the damaging product of the incurability myth within the walls of mental hospitals. The stigma, which it, in conjunction with exaggeration of the role of heredity, places on the mentally ill, is as effective as the medieval belief in demon possession in denying them their rights not only to the means of recovery but to decent living standards.

Social progress is usually made through the organized efforts of those who themselves are the victims of deprivation. The very essence of mental illness, however, is an incapacity to get along with other people, hence organization behind a leader is impossible. The friends or relatives of the mentally ill are equally immobilized through fear of stigmatizing themselves.

The damaging effect of the incurability myth is a thought provoking revelation of the sensitivity of the mentally ill to the attitudes of those about them. Failure to recognize this factor has inhibited psychiatric progress for over one hundred years and to the present day underlies the low standards of many mental hospitals. It is not a little disturbing to compare the recovery rates of the Worcester State Hospital decade by decade during the Century of Progress 1833–1933 (fig. 3, section V). One may contend that this decline in recovery rates from 45 per cent to 4 per cent is an artefact, but the fact remains that it accompanied not only a diminution in treatment efforts, but also a reduction of the patients' standard of living.

We cannot escape the conclusion that our society had, until very recently, become less and less concerned about the fate of its mentally ill during the very years that its standard of living was increasing at an ever more rapid tempo.

IV. Personality and Scientific Outlook in Psychiatric Leadership

The irony of the psychiatric profession today is that it subscribes to the great therapeutic value of dynamic psychiatry in mental illness yet fails to apply its principles in the care of those who are in the greatest need: namely psychotic patients legally confined in our mental hospitals. This failure is largely based on indecision as to the curability of psychosis. The stigma of hopelessness associated with psychosis in the public mind is, to be sure, sorely lamented by psychiatrists. Nevertheless by their own actions they contribute to the stigma by handling psychotic patients as intractable prisoners incapable of benefiting from *any* treatment. The very fact that such a method of handling predominates throughout the world strongly suggests that psychiatrists themselves harbor belief in the very stigma they would remove from society by public education. Such a discrepancy between what is preached and what is practiced does not bespeak cynicism in the profession but rather a lag in the spread of newer knowledge from research and teaching centers which do the preaching to the outlying mental hospitals which receive the vast majority of patients.

As so often happens in science, recently acquired perspectives turn out to be a more precise form of very old perspectives which were left undeveloped. Those who have come to rely on certain habits in giving service, who are not actively engaged in research, and who no longer preserve an open mind in areas in which their own habits come into question, naturally resist accepting the new and devaluate it on the grounds that it was "old stuff" long ago and "nothing came of it".

Psychiatrists cannot afford to forget that unprejudiced open-minded effort to discover any and every means for supplying the personal needs and arousing the dormant faculties of psychotic patients was the very

purpose which gave birth to psychiatry as a profession in the first place.

Dr. Philippe Pinel's twofold discovery, 150 years ago, that organic lesions could not be found in most instances of insanity and that recovery could be achieved through effort invested in supplying personal needs and arousing dormant faculties—which he named moral treatment—clearly indicates that with Pinel psychiatry came into existence not solely as a humanitarian reform in eliminating abuse of the mentally ill *but also as a successful therapeutic enterprise.*

Pinel's report on this discovery, "Treatise On Insanity", was first made available to the English-speaking world in 1806. His account of how he learned of the curability of insanity from a layman is a masterpiece of open-mindedness in psychiatry: ". . . Of the knowledge to be derived from books on the treatment of insanity I felt the most extreme insufficiency. Desirous of better information, I resolved to examine for myself the facts that were presented to my attention; and forgetting the empty honours of my titular distinction as a physician, I viewed the scene that was opened to me with the eyes of common sense and unprejudiced observation. I saw a great number of maniacs assembled together, and submitted to a regular system of discipline. Their disorders presented an endless variety of character; but their discordant movements were regulated on the part of the governor (lay superintendent) by the greatest possible skill, and even extravagance and disorder were marshalled into order and harmony. I then discovered, that insanity was curable in many instances, by mildness of treatment and attention to the mind exclusively, and when coercion was indispensable, that it might be very effectively applied without corporal indignity. To give all their value to the facts which I had the opportunity of observing, I made it an object of interest to trace their alliance to the functions of the understanding. To assist me in this inquiry, I attentively perused the best writers upon modern pneumatology (defined in Webster as the science of the nature and functions of mind and soul), as well as those authors who have written on the influence of the passions upon the pathology of the human mind. The laws of the human economy considered in reference to insanity as well as other diseases, impressed me with admiration of their uniformity, and I saw, with wonder, the resources of nature when left to herself or skillfully assisted in her efforts. My faith in pharmaceutic preparations was gradually lessened, and my skepticism went at length so far, as to induce me never to have recourse to them, until moral remedies had completely failed. . . .

". . . Attention to these principles of moral treatment alone will, frequently, not only lay the foundation of, but complete a cure: while neglect of them may exasperate each succeeding paroxysm, till, at length, the disease becomes established, continued in its form and incurable. The successful application of moral regimen exclusively gives great weight to the supposition, that, in the majority of instances, there is no organic lesion of the brain nor of the cranium" (32).

The effectiveness of moral treatment was first made widely known to the medical profession in America by a physician whose open-mindedness also included the capacity to adopt a layman's conception of the treatment of insanity. Dr. Eli Todd, fearing his own susceptibility to insanity from the knowledge that his father and sister died insane, acquainted himself with the philosophy and method of treatment developed by the Quaker layman, William Tuke, at the York Retreat in England. Dr. Todd was not a Quaker but an avowed religious skeptic who subscribed to the philosophies which gave rise to the French Revolution. Nevertheless he expended all his efforts to have a hospital established in Connecticut along the lines of the York Retreat.

Dr. Todd entered the practice of medicine in 1790 at the age of 20. It was in 1812 that he began playing an active role in behalf of obtaining moral treatment for the insane. In that year he was appointed to the Connecticut Medical Society's committee for investigating the condition of the insane. In 1822 he succeeded in organizing a Society for the Relief of the Insane, and in 1824 he was appointed director of the newly founded Hartford Retreat which was sponsored by the Connecticut Medical Society largely because of Dr. Todd's efforts. Thus it happened that

at a time when England's physicians scoffed at William Tuke's York Retreat, an American medical society actually sponsored a hospital patterned and named after it.

Dr. Todd's "profound sympathy for the insane which stamped all his views and conduct" (25) was probably related to concern that he himself, like his father and sister, was subject to insanity. In any event he was acutely aware of the sensitivity and needs of psychotic patients. It was his view that, "In their whole intercourse with society, their spirits are wounded by a sneer or a jest. . . . The force of their disease is augmented from day to day, and at last suicide or confirmed insanity is the result of accumulated though imaginary insanity" (26). He also commented on the uniqueness of mental suffering in these words, "all other sufferers seek relief from their sufferings and successfully appeal to the kindly feelings of man for sympathy and aid. But unlike all others, the maniac who most needs tenderness and care, is neglected, because he shuns the care and tenderness which he needs, repels the hand stretched out for his relief and would fain bar the door of charity against himself" (44).

Dr. Todd's system of treatment, in the words of Dr. Charles W. Page, ". . . Was not a code of rules for subordinates to enforce, no austere, remote, authority, but personal devotion and painstaking labor with his patients—that method of true leadership in a good cause which always commands respect and insures success" (27).

Dr. Samuel B. Woodward, in his report on Dr. Todd's management of the Hartford Retreat, made the following observations. "In respect to the moral and intellectual treatment, the first business of a physician is to gain the patient's entire confidence. With this in view he is treated with the greatest kindness, however violent his conduct may be,—is allowed all the liberty his case admits of, and is made to understand, if he is still capable of reflection, that, so far from having arrived at a mad-house where he is to be confined, he has come to a pleasant and cheerful residence where all kindness and attention will be shown him, and where every means will be used for his recovery to health. In no case is deception employed or allowed; on the contrary the greatest frankness as well as kindness form a part of the moral treatment. His case is explained to him, and he is made to understand, as far as possible, the reason why the treatment to which he is being subjected has become necessary" (28).

In Dr. Todd's own view his method was based on the law of kindness, mental philosophy, and physiology. He built on the experience of both Pinel and Tuke and combined medical, dietetic and psychological treatments. Under his direction the Hartford Retreat became the model after which so many American mental hospitals were patterned during the first half of the nineteenth century. His personality was also in many of its qualities the prototype of the moral therapists who followed in his steps. Qualities ascribed to him such as benevolence, kindliness, cheerfulness, ingenuousness, and magnanimous altruism were also ascribed to Drs. Samuel B. Woodward, Isaac Ray, Amariah Brigham, Thomas Kirkbride, Luther Bell, and John S. Butler. They shared a common interest in patients first and foremost as *people*. Their writings all contain accounts of their philosophically minded sympathetic investigations of their patients' state of mind. Indeed they did not seem to even think in terms of universally applicable disease processes but rather operated on the general assumption that every patient was a special case and that their duty as physicians was to use every possible means to enhance the welfare and self-respect of patients individually and collectively.

One of the clearest examples of individual psychotherapy as practiced by the moral therapists is that of Dr. John S. Butler of the Boston State Hospital (1839–1842) and the Hartford Retreat (1843–1872), as noted by Charles W. Page. "It was his common practice to dig deeply into the family and personal history of his patients, to establish, if possible, a connection between their mental disorder and some accident or error in their lives. And this he did, not only that he might the more intelligently treat the patient, but that he might be able to give the patient and friends, in case of recovery, such warnings that subsequent attacks might be prevented or at least guarded against" (29).

One of Dr. Butler's principles of psychotherapy was to use positive propositions and never negative ones. It was his claim that all destructive patients responded to persevering efforts in the direction of discovering and respecting their preferences. A specific instance, in the words of Dr. Charles W. Page: "He did not depend upon restraint or seclusion to arrest destructive habits. If a woman tore her dress he aimed to stimulate her self-respect and pride. He would provide her with a new dress conspicuous for its pretty pattern or bright colors. And when he saw her thus clad he would express pride and pleasure, complimenting her on her improved appearance. . . ." (30).

Dr. Butler, it is significant to note, was stimulated to enter the field of mental medicine by witnessing, while a general practitioner, the optimistic outcome of patients treated by Dr. Woodward at the Worcester State Hospital. He visited the hospital frequently, and as a result of his great interest and avid study of patients he was recommended by Dr. Woodward for directorship of the Boston State Hospital (then Boston City Hospital for the Insane) in 1839. Here Dr. Butler applied the methods of moral treatment in the care of long-term chronically insane patients, the results of which won the acclaim of Charles Dickens as related in section II.

In comparison with the complexity of psychiatry today the record of the pioneer psychiatrists seems scarcely credible. Yet without benefit of modern psychological discoveries they provided a high standard of treatment simply by acting on the philosophical assumption that the healthy mind could understand and influence the sick mind for the better. To them it appeared self-evident that every aspect of hospital life had a bearing on the issue of the patients' mental condition. They believed that success depended on constant vigilance to the needs of patients. At the same time they were aware that disappointment was to be expected in patients with general paresis or other psychoses accompanied by signs of organic brain disease. Such disappointment did not, nevertheless, undermine their faith in the effectiveness of moral treatment with the majority of patients. It is not unlikely though, that accumulation of patients with undetected brain disease had something to do with the final decline of moral treatment.

From the time of Dr. Todd's demonstration of the success of moral treatment at the Hartford Retreat in the 1820's to the 1840's, a dozen or so small hospitals were founded and a score or so physicians had become proficient in the application of moral treatment.

In 1841 a new personality came into a position of leadership where the care of the insane was concerned. In that year Dorothea Dix discovered that large numbers of insane individuals were suffering unbelievable abuse in the jails and almshouses of Massachusetts. She also learned of the humane treatment patients were receiving at the three small mental hospitals in that state. From the moment she learned of such suffering and its remedy her soul could know no rest until every abused insane individual was a patient in a mental hospital. With fanatic singleness of purpose she set out on her amazing career of accomplishing reform by direct appeal to state legislatures. She was rapidly successful in achieving the results she demanded, namely the construction of new and expansion of already existing mental hospitals. The Worcester State Hospital was enlarged, as previously noted, in 1843 against Dr. Woodward's wishes by an act of the Massachusetts legislature. Two more hospitals of larger capacity were built in the 1850's. One or two successes did not satisfy Miss Dix. She was not content to sit back until every State of the Union, Province of Canada, and nation of Europe had provided hospital space sufficient to house all the insane.

Her immense emphasis on eliminating gross abuse of the insane had the most unfortunate effect of driving into the background serious consideration of the requirements to be met in securing positive active treatment. The forced inundation of mental hospitals with long standing chronic cases completely ruined moral treatment. Neither the chronic cases transferred to the hospitals from jails, almshouses, cellars, and attics nor the new cases of recently acquired insanity could benefit from the art and therapeutic know-how which had been learned by moral therapists since

the time of Pinel and Tuke. No provisions whatsoever were made for training adequate numbers of physicians in the philosophy and practice of moral treatment.

In the surge of public remorse and pity aroused by Dix, the reform movement jumped to the conclusion that elimination of abuse *in itself* would result in the recovery of the curable. With adoption of the purely negative function of preventing abuse, mental hospitals became, as expressed in the words of Franklin B. Sanborn (for 30 years chairman of the Massachusetts Board of State Charities) ". . . in too many instances . . . centers of intellectual indolence or of semi-political intrigue; to whose busy and well-paid medical men new ideas were irksome, and any forward step in the care of their patients or the guidance of public opinion was the familiar story of goodness going to seed and planting the surrounding fields with a growth which was not goodness, or at least was a degenerate and reverting form thereof. . . ." (35).

Dorothea Dix lived to see her goal of placing all insane in mental hospitals largely accomplished, *but*, again in words of Sanborn, ". . . for the needs of the situation *which her own heroic activity had so largely created* she had neither the vital force nor the special knowledge and discrimination required" (35). Nevertheless she functioned as a self-appointed inspector of mental hospitals. Her imperious manner, rigid opinions, and attitude of censorship introduced a new element into hospital psychiatry, namely the element of fault-finding, critical, punishing authority. Her great political influence with state legislatures gave her considerable voice in the selection of physicians for superintendencies of mental hospitals. It is not unlikely that she was largely responsible for the great emphasis which came to be placed on protecting patients against any and all mishaps and the stagnation of hospital life which resulted from it.

Dix's goal of removing all patients from almshouses and jails to mental hospitals has never been completely accomplished. Indeed as late as 1900 there were as many as 900 patients in the almshouses of Massachusetts—the state in which she began her reform. In 1904 the State Care Act was passed which completely relieved the towns of paying for their patients' support in state hospitals. This was followed by another large influx of patients into mental hospitals from jails and almshouses.

Thus it happened that the much needed and long venerated social reform initiated by Dorothea Dix collided with and brought to a halt a successful approach to the psychological treatment of mental illness.

During the many years this movement was taking place a new type of psychiatrist appeared. He replaced the optimistic, enthusiastic therapeutic orientation of the moral therapist with the prohibitive, restrictive, watchful, mishap-avoiding orientation of the administrative custodian of the insane. Interest in treatment was replaced by interest in diagnosis, legal questions of responsibility, and brain pathology.

A little more than a decade after Dorothea Dix began her campaign for building and enlarging mental hospitals, leadership in American psychiatry passed to the superintendent of the largest state hospital in America—the Utica State Hospital in New York. Dr. John P. Gray was appointed superintendent in 1854, and in 1855 he assumed editorship of the American Journal of Insanity, posts which he held for 30 years. As spokesman of American psychiatry he was the greatest single influence in swinging psychiatry back to the pre-Pinelian position by his vigorous insistence that insanity was always due to physical lesion.

Dr. Gray was the first to introduce the microscope into American mental hospitals for the study of post-mortem material in the search for the etiology of mental diseases. He also took the role of leadership in changing mental hospital organization to treat the mentally ill patient as *physically* ill. He placed great emphasis on rest, diet, proper room temperature, and ventilation. One of his major accomplishments was the invention of a rotary fan for the ventilation of the Utica State Hospital. Dr. Gray was also an authority on legal psychiatry and was in much demand by the courts. He refused to accept deviant behavior such as dypsomania, kleptomania, and moral insanity as psychiatric entities and deplored the custom of consider-

ing them such as unjustifiable shielding of depravity and crime. He made a sharp distinction between mind and brain categorically stating that insanity ". . . is simply a bodily disease in which the mind is disturbed more or less profoundly, because the brain is involved in the sickness either primarily or secondarily. The mind is not, itself, ever diseased. It is incapable of disease or of its final consequence, death" (17). He specified in particular that ". . . no moral or intellectual operations of the mind induce insanity apart from physical disease" (18). Dr. Gray was a man of firm religious conviction. He apparently made no distinction between mind and immortal soul and could therefore not accept the idea of mind being susceptible to sickness. Thus his religious belief and his faith in the microscope combined to support a purely materialistic conception of mental illness.

Dr. Gray's legalistic skill and forceful personality made him the dominant psychiatrist of the latter half of the nineteenth century. The high point of his career was probably his success as an expert witness in proving to the satisfaction of the jury that Guiteau, President Garfield's assassin, was not insane. All told, he was successful in winning acceptance of his main contentions that insanity is due to physical disease and that "crime and depravity" are not psychiatric conditions. His influence on the treatment of the insane led to the practice of relying on rest and diet to aid nature in the cure of the underlying physical disease assumed to be present. He also subscribed to what he termed moral treatment, in the form of amusements, recreation, and occupation, as useful adjuncts to medical treatment. This version of moral treatment was a complete reversal of the original concept of moral treatment as a direct influence on the patient's mental condition. Dr. Gray's views on the nature of insanity precluded any effort toward psychological understanding of patients. He was also "uncompromising, unyielding, and in a certain sense coercive in his views of psychiatry" (23), in the words of his biographer. It is also of significance that when the "National Association for the Protection of the Insane and Prevention of Insanity" was organized in the 1880's, it picked Dr. Gray as its first object of attack. Dr. Gray was also shot through the face by a man later adjudged to be insane. He also drew the criticism of the British psychiatrist, Dr. G. A. Tucker, for arguing that the majority of patients at the Utica State Hospital were allowed out of doors on the basis of the number reported to have gone outdoors on a particular date—a date which Tucker pointed out to be the very time the members of the Association of Superintendents of Insane Asylums were visiting the hospital!

Dr. Gray, it would appear, aroused a great deal of antagonism with his dogmatic narrow view of mental illness and emphasis on administrative efficiency. Nevertheless he is also remembered for abolishing seclusion and restraint, for increasing the freedom of patients, and for increasing the number of attendants in order to give patients more personal care. He was also mindful of the role of stress—physical stress that is—in the causation of insanity, especially those stresses following childbirth. He admitted too that emotional states such as prolonged grief could cause insanity but only by way of producing structural changes secondary to insufficient rest and nourishment. He could not conceive of insanity as a disease unless caused by physical lesion for he stated, "If the mind could so contemplate its own operations, its intellectual conceptions, its moral ideas, its emotional states, as to pass into a state of insanity, as it passes into a state of joy or grief, or jealousy, then insanity is no disease" (19). Here Dr. Gray revealed the basic dilemma of a psychiatry attempting to hue to the line of materialistic medicine in forming its attitude toward, and hence treatment of, psychosis. The question then became one in which the patient's responsibility and culpability hinged on whether his behavior was thought to be the result of physical lesion or not. If his behavior was due to a lesion, then the psychotic patient had a right to be served and waited upon as a sick person. If not, he was deemed responsible for his acts and deserving of punishment. Thus from the point of view of materialistic medicine the medical man should logically disclaim having any role to play with respect to be-

havior not due to physical disease. Psychiatry could not take this position: if it did so it would be a specialty without patients, for the rising specialty of neurology was preempting the field of organic diseases of the nervous system.

It is a curious question why the idea of mental illness without physical lesion was so offensive to Dr. Gray and colleagues who entered psychiatry during the latter half of the last century. For it was belief in the psychologic origin of mental illness which had inspired physicians to specialize in the treatment of mental illness and to found the profession of psychiatry. It would appear that the answer is that the scientifically oriented psychiatrist of the latter decades of the century felt duty bound to adhere to the neat logic of physical science and to discard the metaphysical theories of the unity of man derived from natural philosophy, upon which moral treatment of the earlier decades was based. Scientific psychiatry thus eliminated moral treatment as a definitive therapy and retained it in diluted form as a diversionary adjunct to medical treatment which consisted almost entirely of rest and diet. Thus moral treatment was replaced by the emptiness of custodial care.

Influx of chronic cases of insanity into mental hospitals had already begun to tax moral treatment facilities during the decade preceding the Civil War, when Dix's reform movement was gaining momentum. The great wave of immigration to America following the war was accompanied by a marked and long sustained increase in this influx. Personnel and facilities necessary for moral treatment were not increased in proportion. Recently ill patients suffered corresponding neglect and underwent the additional stress of being thrown among a melange of chronically ill patients. Recovery rates decreased steadily with the passage of each decade. Mental hospital directors generally sought to obscure this fact and continued to support the contention that insanity was curable even though they had come to regard it as a physical disease of unknown etiology. They appeared to believe, along with Dr. Gray, that rest, diet, and diversion was a rational program of treatment. Somehow at that time the concept of insanity as a physical disease meant that it was relatively easy to treat and that the special efforts of the pioneer psychiatrists to meet the psychological needs of patients were not necessary. This overly optimistic view was unfortunately accompanied by the low standards of care. Indeed in many instances propagation of such optimism amounted to being a cynical cover-up of culpable neglect and abuse of patients. Mental hospitals had become as reprehensible as the jails and almshouses from which Dorothea Dix had labored so long to remove patients! And rather fittingly it was an old friend of hers who undertook to reform professional attitudes on the subject of easy curability. He was Dr. Pliny Earle, superintendent of the Northampton State Hospital, Massachusetts.

Dr. Earle's psychiatric career like that of Butler, Ray, and Kirkbride began in the 1830's and ended in the 1880's. It included both the moral treatment era and the physical disease era of nineteenth century psychiatry. And like Dr. Butler, Earle was inspired to enter the field of psychiatry by Dr. Woodward's work at the Worcester State Hospital. Dr. Earle took special interest in psychiatry in medical school. His graduating thesis (1837) was on "The Causes, Duration, Termination, and Moral Treatment of Insanity". After finishing medical school he went to England and France where he observed the care of patients by Tuke's followers at the York Retreat, and by Pinel's followers at the Bicetre and the Salpetriere in Paris. After his return to America he was appointed resident physician to the Friends Retreat at Frankford, Pennsylvania, in 1840. Here he pursued the methods of moral treatment and eliminated bloodletting and drastic medicinal treatments which had become the practice in that hospital from the influence of Dr. Rush.

Within the framework of moral treatment he included psychological study of his patients' mental state. Like other physicians of that day he was versed in phrenology and familiar with the phenomena of mesmerism. He was especially impressed with the practical value of the former from personal experience. In 1842 he wrote: "The examination of Stephen Earle's head (Dr. Earle's brother)

and of mine by L. N. Fowler did more to convince me of the practical utility of phenology—not to say of its truth as a science—than anything else that I ever saw, read, or heard. Stephen was told what I believe he might have been rather than what he is. But, for myself, I doubt if any of my nearest relatives or most intimate friends could have given a more accurate synopsis of my character. . . ." (36).

Dr. Earle also constructed psychodynamic formulations of the patient's mental conflicts in the anatomic-psychic language of phrenology. The following account of one of his patients at Frankford gives some idea of his effort to understand patients: "He is unsettled, restless, and constantly worrying about something. His Conscientiousness thinks that the buttons of his vest, which are covered with plain black "lasting", are too gay. His Reverence is in an inexplicable quandary in regard to a copy of Scott's Family Bible, which it and Acquisitiveness procured. After the purchase, Reverence, reading the commentary, became dissatisfied, and openly promulgated dissatisfaction. Hereupon Destructiveness advised to burn the book. 'That would be a wise expedient for the commentary', remarked Reverence, 'but for the text it would be sacrilegious, and to separate them is impossible'. Benevolence, hearing the colloquy, proposed to give the book away. 'And contaminate somebody else, eh' cried Reverence, holding up both hands in astonishment. At this point Secretiveness whispered that, if he had the management, he would box the book up, and hide it among the lumber of the garret. 'And thus contaminate posterity', exclaimed Reverence and Philprogenitiveness, simultaneously. Here the consultation ended, and poor Reverence can see no way out of the dilemma. Acquisitiveness and Conscientiousness have long been in combat. The former came into possession of some notes of hand, and, on the day they were to be renewed, sat down composedly to cast compound interest on the several sums. At this moment Conscientiousness came in, declaring that Acquisitiveness was doing wrong. 'Bigot!' cried Acquisitiveness: 'You are always meddling with other people's affairs'. 'But you outrage justice', said Conscientiousness in a tone which showed he was spurred on by his neighbor Firmness. 'Grumble and growl away', retorted Acquisitiveness. 'I shall stick to my text, and pocket the compound interest'. The field was won by the last speaker. Conscientiousness retreated, but has kept up a kind of predatory warfare ever since" (37).

Although Dr. Earle apparently understood the role of conflict in insanity, there is no evidence that he sought to relieve it through direct discussion of mental content and personal history with patients singly or in groups as did Dr. Butler. Quite to the contrary Dr. Earle relied mostly on lectures on a variety of subjects and demonstrations of scientific experiments to mobilize healthy mental activity. No doubt his experience as a school teacher influenced his choice of method. He also carried out a program of full activity including entertainment, recreation, and work.

In 1844 Dr. Earle was appointed the first medical director of the Bloomingdale Hospital (now Westchester Division of the New York Hospital) which had been under lay management since its founding in 1821. Here Dr. Earle further elaborated his program of treatment but met with disappointment in attempting to persuade patients to work. They were of the wealthy classes and objected to working on the grounds that they paid their keep. It is not unlikely that his short term of office at Bloomingdale—five years—was the result of disagreements arising over his efforts to enforce his policy on work for patients. In 1847, while at Bloomingdale, Dr. Earle discovered the first case of general paralysis to be diagnosed as such in America. Among the cases of this disease, already established to be incurable by Calmeil, diagnosed by Dr. Earle one patient recovered who was perfectly well 10 years after his discharge from the hospital.

On leaving Bloomingdale in 1849 Dr. Earle went on an extended tour of German mental hospitals. In the course of this tour he came in contact with concepts which held insanity to be a hopeless physical disease. He also saw many more cases of general paresis which was regarded by some German psychiatrists at that time not as a disease entity by itself but as an end stage of insanity in general. He was

also greatly impressed with German administrative efficiency and discipline, especially where it had put into effect an extensive work-program for patients.

On his return to America Dr. Earle's expectation of being appointed superintendent of one of the newly established mental hospitals did not materialize. He took up residence in his home village of Leicester, Massachusetts, where he remained in professional inactivity for about three years. He then went to New York City and opened an office as a consultant on mental disorders. While in New York he was appointed to a committee of medical visitors to the city asylum on Blackwell's Island where he saw still more cases of general paralysis and the evil results of hospital mismanagement. He remained in New York for but a short time and then travelled in the South and to Cuba. In 1854 he returned to Leicester where he remained in retirement for 10 years. During this time he studied annual reports from mental hospitals all over the world. In the words of his biographer, "He bided his time with some impatience and not without months and days of despondency. He lived at Leicester, in a small house, and amid humble duties of one sort or another" (37). The reason for his despondency was presumably his disappointment of seeing physicians less qualified than himself appointed as superintendents of the many mental hospitals built during those years. This is not certain, however, for he was subject to periods of depression throughout his life as were other members of his family. There is some evidence also that his mood swings went in the other direction, for his biographer noted that "Punning, indeed, in its many forms was carried by him to an excess. It was one kind of grammatical exercise in which he long delighted."

In 1864 Dr. Earle was finally appointed superintendent of the Northhampton State Hospital in Massachusetts. Here in marked contrast to the Bloomingdale Hospital, he had charge of 450 patients, practically all of the "pauper classes", and nine-tenths of whom were long-standing chronic cases which had been transferred to Northampton to make room for new admissions to the other state hospitals. Nevertheless Dr. Earle pursued the program of moral treatment as developed by him at Bloomingdale. At Northampton he had one advantage at least: there was no objection to his enforcing his ideas on manual work for patients. He also completely revamped the administration of the hospital by introducing methods for achieving business efficiency and discipline which he had admired in Germany. Yet in spite of his respect for his patients' love of beauty (he hung over 1,500 pictures in the hospital), in spite of his giving lectures and directing recreational activities more than 300 evenings a year, and in spite of his success in persuading a majority of his patients to work, he found his recovery rates to be much lower than those reported by his contemporaries. He knew furthermore that many of his fellow superintendents were political appointees who had no training in psychiatry and no interest in patients. He was also fully aware that none of the other state hospitals had a program of moral treatment remotely approaching his own.

Dr. Earle was a deeply religious Quaker. He was also overly modest, scrupulously honest, and very frugal. He despised ostentation of any kind. He also disapproved thoroughly of vindictiveness, but there was one issue which aroused his righteous anger and about which he could not remain silent. He abhorred the current practice of building large "palace hospitals" which he considered to be extravagant shams covering up neglect of patients. From his point of view the rationale for building such hospitals was based on the fallacy of easy curability. He therefore set out to prove through presentation of statistical data that cures were much less frequent than commonly believed at that time. In his own opinion his statistical studies were, ". . . an important agent in stimulating the minds of philanthropists to seek—and in several notable instances to adopt—other methods for the custody and care of a large part of the insane than that of collecting them in expensive and unwieldy curative institutions" (10).

Unfortunately Dr. Earle's studies had the opposite effect of promoting extreme pessimism in psychiatry and almost complete cessation of treatment efforts. Yet the very

data on which he based his conclusions form a basis for a far more optimistic outlook than is commonly held today! These data are presented and discussed more fully in the following section.

In the case of Pliny Earle, to compare him with Dorothea Dix, the "goodness that went to seed" lay in the interpretation of his statistical work to the effect that incurability was an attribute of mental illness itself. His intention was to destroy complacency and bring about sound methods of treatment. He showed that recovery rates were higher in the early decades of the nineteenth century than in the 1870's and '80's. He pointed out that breach of the principle that no more than 200 patients should be cared for in one institution was partly responsible for the poorer results of the later years. Likewise he demonstrated certain fallacies in the statistical reports of the early superintendents which had resulted in some exaggeration of their recovery rates and showed that relapses of recovered cases further reduced the proportion of "true" recoveries. Through his tenacious efforts he was able to convince himself and others that recoveries had been less frequent in the past than had been realized and that they were becoming even less frequent. This insistence on the infrequency of recovery and the statement that the disease itself was becoming more incurable obscured the fact that recoveries were not only possible but had been as frequent as 70 per cent of admissions in well-run institutions.

Doctor Earle was not only successful in changing the outlook of physicians on the curability of insanity, he was also largely responsible for an important change in the attitude of state administrators regarding the functions of superintendents of mental hospitals. His own great frugality, love of arithmetic (he was also the hospital's treasurer), knowledge of farming, and ability to persuade patients to work enabled him not only to operate the hospital more economically than any other superintendent, but to show a profit! The following account by Franklin B. Sanborn portrays in detail Dr. Earle's success as an administrator:

"At the end of Dr. Earle's fourth year (at Northampton) not only had the valuation of the hospital property increased by nearly $30,000 since he came, but the trustees were able to say, 'For the first time since the founding of the hospital we have passed a year without borrowing money', and they closed the year with a balance of near $10,000 in hand. This balance went on increasing—though often drawn upon for other than current expenses—until when Dr. Earle resigned in 1885, it stood at $34,000; while the valuation figures had gone up from $272,000 in 1864 to more than $440,000 in 1885. This gain came from the high cultivation of the enlarged farm, the better labor of the employed patients, the systematic handling of all expenditure, and for a time the increased income from private patients.

"By the prudent management of the hospital, Dr. Earle disarmed criticism on the economic side, and made his establishment popular with the legislature and the State authorities, who had been accustomed to see it a frequent applicant for appropriations, not only for repairs and new building (as was the case with other hospitals), but for deficiencies in its current expense. To meet the lack of a working capital, which every new hospital feels, the Board of State Charities, in accord with Dr. Earle, procured advance payments for nine-tenths of the State patients there (which was perfectly safe, since they were permanent boarders), and this enabled him to make cash purchases, and thereby reduce the current cost. This he also reduced materially by introducing the system of distributing supplies which he had seen practised in frugal Germany; each person employed being made accountable for the articles delivered upon his request, and thus becoming more careful against waste or theft,—the latter by no means unknown formerly in such establishments. In this way he became a model for other hospitals to follow, as they gradually did, but not until some of them had suffered from extravagance and peculation so as to attract public notice" (38).

The phenomenon of a mathematically minded, hard-headed business man with knowledge of agriculture, being at the same time a wise physician and skilled psychiatrist was indeed fortunate for the Commonwealth in a financial way. It was unfortunate, however, that his penurious qualities were the ones most admired by the state administrators

and that they helped to establish a precedent of choosing men for superintendencies who had these same qualities.

Some of Dr. Earle's opinions about insanity provide clues which suggest why he placed such stress on its incurability. First, he regarded insanity as a mystery, for he said, "The disorder,—not to say 'disease', inasmuch as disease implies the possibility of death,—in its essential nature, and even in its relation to the conduct and the practical ability of those who are affected with it, is an inexplicable mystery to persons who are constantly surrounded by it, and who are consequently better informed than any others in regard to it" (39). Second, he discounted the idea that the insane suffer unhappiness. He even contended that depressed patients went through the motions of being sad in a machine-like fashion but did not really feel it. He explained away the suffering of insanity in the following words: "I do not forget, but am most free to acknowledge, that the worst wards of a hospital of this kind present a sad spectacle, even to persons familiarized with it,—a very sad spectacle to anyone to whom it is an unaccustomed sight. But this aspect is the consequence of mental impairment and bodily deterioration, and is no evidence of unhappiness on the part of the patients. The observer derives his judgement from his own feelings and emotions, not from the mental and moral condition of the persons around him, which, particularly if he be a casual visitor, he cannot accurately know" (40). Yet Dr. Earle was in no way a callous man. Apparently he did not believe insanity to be accompanied by suffering because he, like Dr. Gray, equated mind with immortal soul and did not believe it was susceptible to disease—as indicated in the following statement: "Were the arguments for the hypothesis that in insanity the mind itself is diseased tenfold more numerous than they are, and more weighty, I could not accept them. My ideas of the human mind are such that I cannot hold for a moment that it can be diseased, as we understand disease. That implies death as a final consequence, but Mind is eternal. In its very essence and structure (to use the terms we apply to matter), in its elemental composition and its organization, it was created for immortality. Consequently, beyond the scope of the wear and tear and disorganization and final destruction of the mortal part of our being" (40). And along a similar vein he remarked, "The longer I live, the more I am impressed with a belief in the all-controlling supremacy of mind over matter, of the far-reaching, mysterious power of the divine intelligence within, and of the limited bounds of present knowledge, compared with what is to be known when mind shall have thrown off its fetters of clay. Science is proud, even presumptuous; but how much cause for humility in the fact that it cannot trace one particle of its knowledge upward, through effects, to the original cause and center of all things! Science is lost at once in the mazes of uncertainty and ignorance, whenever it attempts to fathom mind itself" (41).

Apparently Dr. Earle's concept of the incurability of insanity had a special meaning to him in terms of his own philosophy of life. There is little doubt that he felt a great affinity for the insane, for he devoted his life to their care, never married, and was a victim of depression himself. His biographer said, "Consecration is the right word to describe his care for the insane. With all his worldly prudence and common sense, and notwithstanding his broad toleration of theological differences, he was from the first, and essentially a religious man, governed in all the important actions of life by a sense of religious duty and that regard for the fatherhood of God and the brotherhood of man, which the small sect of his family and forefathers especially cherishes. Of the narrowness of the Quaker church he had nothing: of the profound instinct of divine guidance and the worth of the human soul he had much. In the growing strength of materialism among scientific men and physicians, he still maintained the spiritual and immortal nature of our minds, and could have said with Shakespeare, 'I think more nobly of the soul, and no way approve their opinion'. . . . It required some courage and firm religious conviction to adhere to this noble opinion during the latter half of the passing century. . . ." (40).

Another aspect of Dr. Earle's personality is described by his biographer as follows: "And one of the chief qualifications of a superintendent for such a difficult position

was as marked in Dr. Earle as in any of the hundred superintendents and directors of hospitals and asylums whom I have personally known in an experience now covering 35 years (written in 1898),—his strictness of discipline, both for patients and attendants. This, which sometimes passed for unkindness, and was really exacting now and then, was the truest kindness when the real interest of all persons was considered. The inflexible justice of a most kindly nature thus displayed itself, often at the cost of much pain to the doctor himself" (42).

There is no doubt that in one sense Dr. Earle took excellent care of his patients. They were not only better fed but had a lower death rate than those of any other hospital in the country. Also they had the busiest and most interesting community life of any hospital at that time. Nevertheless there is some suggestion that there was a connection between the fact of a high proportion of working patients, low discharge rates, and the excellent financial condition of the hospital. Indeed Dr. Earle's biographer makes the following statement: "It was to this steady but not compulsory discipline of labor that the financial success of the hospital was due in great part; and, though the record of recoveries at Northampton showed small numbers, because the cases were so largely chronic, yet there were many unrecorded *virtual* recoveries,—patients who, while still insane, were capable of self-support and self-direction under kindly supervision" (43). It might be said that Dr. Earle behaved like an overprotective father who fostered dependency and could not countenance patients leaving the family fold.

Dr. Earle's philosophy and methods of patient-care in mental hospitals are by no means merely an historical curiosity. He was regarded as the model superintendent by the Massachusetts Board of State Charities, and through that body he had an influence on the makeup of mental hospitals which has lasted up to the present day. Dr. John P. Gray exerted a similar influence on the development of New York state hospitals.

It is over 60 years since Dorothea Dix, Dr. Pliny Earle and Dr. John P. Gray died and left behind them the mark of their particular personalities on the care of the mentally ill. Since that time revolutionary changes have taken place in the whole of society, in medicine and in psychiatry itself *as a science*. Yet in *practice* psychiatry has had little or no effect on the care of patients in mental hospitals. Indeed the perspectives and methods of Dix, Earle, and Gray have become a deeply ingrained tradition.

As long ago as 1901 Dr. Charles W. Page, superintendent of the Middletown State Hospital in Connecticut, gently reminded the psychiatric profession of the need to return to the principles of the early moral treatment era: "It is now more than half a century since Butler formulated in his mind those tenets, or methods, the application, or execution of which gave him a prominent position as a specialist in mental disease. This period has been marked not only by great changes in the social condition of our population, but most surprising advances have been made in science and the arts.

"Medicine, in some branches at least, has been rewritten upon a basis of comparatively recent science. In keeping with the general trend of business affairs, lunatic hospitals have undergone changes. They have rapidly increased in numbers and vastly expanded in size. In their laudable desire for a scientific standing they vie with each other in providing laboratory facilities. Medical officers also are burdened with executive obligations, and ambitious ones must devote much time to pathological questions. With the pressure of these new, interesting and important considerations, painstaking personal efforts with individual patients are in danger of being neglected. And yet the power of the mind over the body, and the laws of sympathy which, unfortunately, cannot be stated in scientific terms, have undergone no changes, and will ever respond to right application.

"Is there not an obvious moral to be drawn from a review of Butler's life-work, namely our duty to uphold and utilize as fully as possible in our practice these powerful moral agencies which the fathers of New England psychiatry, Todd, Woodward, Butler, and others found so efficacious in treating the insane?" (31).

(*To be continued in next issue*)

THE EFFECT OF ELECTROSHOCK THERAPY IN THE ABSENCE OF BOTH ADRENAL GLANDS[1]

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The association of severe psychiatric disorders with Cushing's Syndrome or hyperadrenocorticism has been repeatedly noted. The nature and clinical course of the associated psychiatric syndromes are still obscure, and the connections between the metabolic derangements and the behavior or emotional disturbances still remain to be clarified. We have observed a patient whose clinical course raises many interesting questions about these points which cannot be answered from the data in the case. However, unusual events have enabled us to answer one question concerning the mechanism of action of electroshock treatment in depression. This case is being reported to demonstrate the effect of electroconvulsive therapy for severe depression in a patient who had previously undergone bilateral total adrenalectomy for bilateral adrenal hyperplasia manifesting itself in a moderately severe form of Cushing's Syndrome. We know of no previous report.

The patient was first seen in Barnes Hospital on February 16, 1951. At that time she was 34 years old and gave the following history. She had apparently been in excellent health until 18 months prior to this admission when she noted that her face became swollen, flushed and hot. The following day she developed arm and ankle edema with some weight gain and felt extremely nervous and shaky. Because of these symptoms she consulted her local physician, who could find no evidence of renal or cardiac disease. She had no glycosuria and was told that her BMR was normal. There was a moderate response to diuretic agents, and her arm and ankle edema subsided but her face remained swollen. Her nervousness increased, and in November of 1949 she was hospitalized in Springfield, Illinois, for a "nervous breakdown". She was seen by a physician who felt that she had myxedema and started her on thyroid. Her symptoms persisted, however; in addition she noted that her hair was falling out and becoming quite dull in character. She also noticed that her skin had become dry and that she had an increase in hair growth on her upper lip, chin, and over the dorsum of her hands and legs. She then developed pains in her back and occasionally also in her arms and legs. There was no improvement in her general condition; she noted a feeling of extreme weakness and exhaustion.

She consulted another physician and in January, 1950, was started on estrogens. She continued much the same until June, 1950, when she observed a decreased roundness of her face, a return of hair growth on the scalp and a recurrence of her menses, which had stopped entirely at the onset of her illness. At this time the menstrual periods became quite regular. In October, 1950, with the onset of cold weather, she began to feel worse again. Her face became round once more, and she remarked that her neck was thicker and that a "hump" appeared on the back of her neck. She was too tired to do her regular work, and she felt depressed and moody much of the time. Her sexual interest vanished. She noticed that her hands and face were often bluish-red, and at night she tended to perspire more than usual. Her physician then found that she had hypertension with some variability of the blood pressure readings. There was no glycosuria at that time. The patient noted that the intensity of her symptoms varied and that she began to develop episodes of palpitation associated with hypertension.

Her past medical history was negative except for seasonal hay fever. The family history revealed that a paternal grandmother had diabetes and was quite obese. Her father was described as having been a heavy-set man with thin arms and legs. He was supposed to have

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had a round, red face, diabetes and hypertension. He died of a cerebrovascular accident. Seven siblings were living and well. The patient was married and had three children, ages 13, 7 and 5.

Physical examination revealed normal vital signs. The patient was a young woman with a very round, pink face who appeared older than her age. She was nervous but not in any other obvious distress. There was a slight increase in hair noted on the upper lip, chin, legs and cheeks. There were a few white striae noted over the buttocks and hips. No purple striae were seen. She had a slight acneiform eruption of the back, chest and forehead. The eyes were entirely normal, including the fundi. There was no gross visual field defect noted. The neck was thick, the thyroid was not palpable. Posteriorly there was a typical "buffalo hump". The areolae of both breasts were quite dark. The clitoris was normal size, as was the uterus. The remainder of the physical examination was within normal limits. Laboratory studies on this admission revealed a red count of 4.94 million with a hemoglobin of 15.4 grams per cent. The white blood count was 14,250 with a normal differential pattern. An initial urinalysis was normal except for the presence of 15–20 white blood cells per high power field and the presence of coliform organisms on culture. A repeat urine, this time catheterized, revealed a slight trace of sugar but was otherwise negative. The urine culture revealed no growth. The stool examination for blood and the serological test for syphilis were both negative. Her NPN was 20 mg. per cent, the fasting blood sugar was 114 mg. per cent. The calcium was 11.6 mg. per cent while the phosphorus was 2.9 mg. per cent with an alkaline phosphatase of 3 Bodansky units. Her serum sodium was 155.6 milliequivalents per liter while the serum potassium was 4.2 milliequivalents per liter. Her serum chloride was 101 milliequivalents per liter, and the CO_2 combining power of the serum was 29.3 milliequivalents per liter. A glucose tolerance test revealed a fasting blood sugar of 114 mg. per cent with a one-hour sugar of 252 mg. per cent, a two-hour sugar of 192 mg. per cent and a three-hour sugar of 121 mg. per cent. Urine sugars revealed 3+ glycosuria at the second hour and a trace at the third hour. Her BMR was −15 per cent. An electrocardiogram was within normal limits. X-ray examination of the chest and skull was within normal limits. There was some question as to the presence of minimal osteoporosis in the films of the spine. An intravenous pyelogram was read as normal, but a soft tissue density was noted in the pelvis on this examination.

On February 22, 1951, determinations of the urinary steroids revealed a 17-ketosteroid level of 21.8 mg. per 24 hours with a level of 4.7 mg. per 24 hours for the formaldehydogenic steroids determined by the method of Daughaday *et al.* (1). On February 24, 1951, these values were repeated and were identical. Such values were clearly in the range of hyperadrenocortical activity by the above methods.

Because of the pelvic mass noted on the roentgenogram, the patient was seen by a gynecological consultant who felt that he could not differentiate between a uterine myoma and an ovarian tumor. On March 6, 1951, the patient was subjected to a laparotomy at which time a myomectomy and an appendectomy were performed. At the same time, both adrenals were palpated and were found to be within normal limits. Biopsies of both ovaries were taken. These subsequently were read as within normal limits. The myoma turned out to be a leiomyoma of the fundus. Following her recovery from the operation, the patient was subjected to x-radiation to the pituitary and received a total of 2600 roentgens through left and right temporal ports. This treatment was carried out from March 7, 1951, through March 17, 1951.

She was treated with estrogen and testosterone therapy, but did not do well. Her symptoms progressed and she was rehospitalized on August 8, 1951, for further observation and study. During this hospitalization, the patient had bilateral subtotal adrenalectomies performed, removing approximately 85 per cent of the left adrenal gland and 90 per cent of the right adrenal gland. The pathological report was that of bilateral adrenal hyperplasia. Post-operatively, the patient developed pneumonitis and congestive heart failure. These complications were controlled satisfactorily with digitalis and antibiotics. On September 18, 1951, while she was convalescing, measurement of urinary

steroid excretion gave values of 6.6 mg. per 24 hours for the 17-ketosteroids and 1.5 mg. per 24 hours for the formaldehydogenic steroids.

Her third admission to Barnes Hospital was on February 12, 1952. During the interval since her second admission her condition had not changed significantly. However, she had gained weight, and it was decided during this admission to discharge her briefly and then readmit her for further adrenal surgery. She was therefore admitted to Barnes Hospital for the fourth time on March 15, 1952, and discharged on April 2, 1952. During this admission, the left adrenal gland was completely removed. Seven months later on November 29, 1952, she was admitted for the fifth time and following a period of observation was discharged on December 6, 1952. During this admission it was clear that the patient was still quite weak, tired easily, and was gaining weight. Her glucose tolerance curve at this time was still diabetic in nature. Also, there was an increase in the urinary steroids. She was admitted for the sixth time on June 6, 1953, and discharged on June 18, 1953. At this time she had the same complaints as well as irritability and depression. The patient was treated with cortisone and discharged. Her seventh admission was on July 17, 1954. She was discharged two days later. She was seen this time for similar complaints of weakness, irritability, depression and some weight gain. During the interval between the patient's sixth and seventh admissions to Barnes Hospital, she was admitted to a hospital in Springfield, Illinois, under the care of a psychiatrist who administered seven electroshock treatments to her with moderate temporary improvement in her depression.

At the time of her seventh admission, the patient's face was still relatively round, though there was no evidence of any hirsutism. There was also no evidence of acne. Her blood pressure was 155 mg. Hg systolic and 95 mm. Hg diastolic. She had a non-protein nitrogen of 29 mg. per cent, a fasting blood sugar of 89 mg. per cent, a cholesterol of 231 mg. per cent, a serum sodium of 139.4 milliequivalents per liter with serum potassium of 4.4 milliequivalents per liter and a CO_2 combining power of 19.7 milliequivalents per liter. Her serum chloride was 106 milliequivalents per liter. Her protein-bound-iodine was 6.5 gamma per cent. Her electrocardiogram showed a sinus tachycardia with auricular premature contractions. Evaluation of the urinary steroids showed that the 17-hydroxycorticosteroid excretion was 13 mg. per 24 hours by the method of Silber and Porter (3) and the 17-ketosteroid excretion was 9.0 mg. per 24 hours. A glucose tolerance test revealed a fasting blood sugar of 72 mg. per cent, a one-hour value of 235 mg. per cent, a two-hour value of 111 mg. per cent and a three-hour value of 79 mg. per cent. Evaluation of the entire clinical picture at this time warranted the conclusion that the patient was still suffering from hyperadrenocorticism, and it was decided to submit her to a total adrenalectomy, removing the remaining 10–15 per cent of the right adrenal gland. Consequently, on August 2, 1954, she was subjected to a final adrenalectomy removing the remnant of the right adrenal gland. The pathological report again was that of adrenal hyperplasia. Postoperatively, her urinary steroid excretion was as follows: 17-ketosteroids, 1.8 mg. per 24 hours and 17-hydroxycorticosteroids, 4.9 mg. per 24 hours. Since these values were in the range of Addison's disease, the patient was maintained on 12.5 mg. cortisone three times a day and 2 mg. sublingually per day of desoxycorticosterone acetate.

Following the patient's discharge from the hospital on July 19, 1954, she began to feel quite well. She was not as lethargic and did not feel as depressed or nervous. However, in the early part of the winter of 1954 she began to feel more and more depressed, and as the manifestations of depression developed, she began to show some paranoid feelings and thoughts about her husband. She slowly developed feelings of self-degradation and self-depreciation to the point where she began to feel that life was not worth living and that the only reason she was continuing on was the fact that suicide would be "too dreadful" a thing to do to her family and children. Consequently, on April 19, 1955, she was admitted to the psychiatric service.

Physical examination revealed a blood pressure of 118 mm. Hg systolic and 84 mm. Hg diastolic, with a pulse of 94 showing occasional premature contractions. The skin was smooth

throughout. There was no evidence of any unusual hair growth or distribution. Her weight, which was fairly constant, was 147½ pounds. She had the scars of her previous surgery, but otherwise there were no positive physical findings. Her admission laboratory studies were within normal limits.

It was felt that the patient was suffering from a moderately severe depression and that she was a good candidate for electroshock treatment. Prior to the institution of electroshock therapy, her adrenal status was re-evaluated. Laboratory studies revealed a serum sodium of 149.4 milliequivalents per liter with a serum potassium of 4.5 milliequivalents per liter. Her serum chloride was 106 milliequivalents per liter with a CO_2 combining power of 27.1 milliequivalents per liter. Her non-protein nitrogen was 20 mg. per cent and her cholesterol 201 mg. per cent. A glucose tolerance test revealed a fasting blood sugar of 62 mg. per cent with a one-hour sugar of 122 mg. per cent, a two-hour sugar of 59 mg. per cent and a three-hour sugar of 59 mg. per cent. Her protein-bound iodine was 4.8 gamma per cent. Her cortisone medication was discontinued, and she was treated with a maintenance dose of fluorohydrocortisone (which would not effect her urinary steroid levels). On this program, steroid excretion was as follows: 17-ketosteroids 2.5 mg. per 24 hours (normal = 5–15 mg.) and 17-hydroxycorticosteroids 4.4 mg. per 24 hours (normal = 7–15 mg.). These values testified to her total adrenalectomies. Before she was begun on electroshock therapy, she was subjected to intensive ACTH stimulation in the form of six-hour intravenous infusions. Studies of her blood eosinophiles and urinary steroids revealed no evidence of adrenal response.

The patient received a total of 10 electroshock treatments on alternate days and showed quite marked improvement during the course of treatment. During the course of the electroshock therapy she received 37.5 mg. of cortisone each morning at the same hour. Daily steroid determinations were made. On the non-shock days the values for 17-ketosteroids averaged 4.7 mg. per 24 hours, and for 17-hydroxycorticosteroids they averaged 11.6 mg. per 24 hours. On the days on which shock was given the values for 17-ketosteroids averaged 6.6 mg. per 24 hours and for the 17-hydroxycorticosteroids 11.5 mg. per 24 hours. These values demonstrate neither an increase in steroid production nor an increased rate of steroid degradation with shock. Studies were also made of blood 17-hydroxycorticosteroids, with and without shock. The plasma 17-hydroxycorticosteroids were measured by a modification of the method of Nelson and Samuels (2). On the shock day, the values were as follows: 15 minutes pre-shock, 34 gamma per cent; 15 minutes post-shock, 29 gamma per cent; and 30 minutes post-shock, 27 gamma per cent. On the non-shock day, the corresponding values were 43, 38, 38 gamma per cent. These blood levels of 17-hydroxycorticosteroids confirm the urinary results in showing neither an increase in blood levels nor an accelerated rate of steroid degradation with shock. She was finally discharged on June 15, 1955, markedly improved so far as the depression was concerned and taking 12.5 mg. of cortisone three times daily with 2 mg. of desoxycorticosterone acetate sublingually each day. Follow-up observation nine months later revealed that the patient continued to do well. She was placed on Thyroxine, 0.2 mg. per day, because of persistent fatigue with striking improvement in this symptom, and she is now actively carrying out her social and family functions.

Summary

This patient, therefore, is presented to demonstrate that an intact, functioning adrenal cortex is not required for successful use of electroshock treatment in depression.

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QUALITATIVE FEATURES OF SCHIZOPHRENIC THOUGHT IN THE FORMATION OF SOCIAL CONCEPTS

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A number of studies have demonstrated that aspects of schizophrenic thought can be characterized as an inability to generalize or to form concepts. Thus schizophrenics have shown a decrement in performance relative to normals on concepts of form, color, and number (2, 5, 6). A recent study by the writer (13) has presented evidence for the thesis that schizophrenic decrement may be a function of the type of concept used in experimental operations. Thus impairment on a social concept test was found to be greater than decrement on tests of concepts which were less socially toned and less laden with interpersonal connotations.

The purpose of this report is to present certain qualitative features of schizophrenic thought as manifested on the social concept test in the experiment cited above (13). The emphasis here is not on quantitative scores derived from summations of passed items, but on the various ways in which the schizophrenic group conceptualized differently from the controls when required to form social concepts.

PROCEDURE

A pictorial social concept test was administered to 31 schizophrenics and 31 normal controls matched with respect to age, education, sex, and intelligence as measured by the Wechsler-Bellevue Vocabulary score. A more detailed description of the populations may be found in a previous study (13). Each of the 21 items of the social concept test contained 3 cards depicting instances of a social concept, with the remaining card or cards in the item representing negative instances. For example, in the case of the "rescue" item, the three concept cards included (a) a picture of a man rescuing a girl from the path of an advancing truck; (b) a scene depicting a fireman rescuing a person from a burning building; and (c) a picture of a man throwing a life belt to a swimmer in distress. For the non-concept card, there was a scene showing two children on sleds racing toward a busy intersection. The subject's task was to separate the three cards that had the same idea from those that did not have that particular idea, and then to explain the sorting.

RESULTS

a) The first category to be considered might be termed the "uniqueness" of the response, defined simply as a sorting which occurs only once in the entire group tested, control and schizophrenic. The differences here are quite striking. Whereas 77% of the schizophrenics gave at least one unique response, only 23% of the controls offered at least one unique response. The chi-square for the differences between the two groups is significant at below the .001 level of confidence (chi-square = 11.13, df = 1).

b) A second basis for classification deals with the type of verbalizations. The explanations of the sortings were classified according to whether a concept was explicitly verbalized independently of the particular cards selected to exemplify the concept, or whether the subject's verbalizations were descriptions of the particular cards he sorted, descriptions which may or may not include a concept implicitly. An example of an explicit concept would be the subject's responding "lending a helping hand" to a sorting consisting of (a) a card showing one ice-skater helping to pick up another who has just fallen; (b) a card showing a blind man being helped across the street by a pedestrian; (c) one housewife saying to another, "Sure I'll lend you some sugar if you're all out of it." An example of a non-explicit concept would be sorting a card depicting a hold-up scene in a store, together with a card showing a pickpocket at work, with the explanation, "He went into the store to hold him up, and he's picking his pocket—same idea." Thirty-nine per cent of the schizophrenics offered only explicit concepts as compared to 77% of the controls. The difference in the proportions between the two groups is

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significant at the .01 level, with a chi-square of 6.72.

c) Significant differences between the two groups were also found in regard to frequency of rejections, i.e., the inability to decide upon a sorting of the cards on any particular item. Thus 32% of the schizophrenics displayed one or more rejections as compared to 3% of the normals. The difference in proportions is significant at the .01 level (chi-square = 7.11).

d) An interesting difference between the two groups is the greater tendency among the schizophrenics to ignore the social-personal values of the card in favor of what may be termed a "physicalistic" basis of abstraction. Such physicalistic concepts are concerned mainly with the physical aspects of the depicted situations, or with the bodily positions (or changes in the bodily positions) of the depicted characters, or with the relationship of the people in the cards to some physical object. Examples are: "these take place on land rather than water", "getting a vehicle into motion", "people in activity", "these have clothes on them", "they're all sitting down", "something to do with a car", "exercise", "physical energy", "outdoors", "Doing things in time or rhythm", "traveling", "repairing something". Physicalistic concepts occurred in 81% of the schizophrenic group, and in 42% of the normals (chi-square = 8.64, significant at the .01 level).

e) Another category that was considered for intergroup comparison might be called "inappropriateness" and can be defined quite objectively as giving the correct verbal response to the item but sorting the cards incorrectly. It reveals that the individual possesses the concept in his response repertoire, but misapplies it. Inappropriate responses were offered by 48% of the schizophrenics as compared to 16% of the controls (chi-square = 5.78, significant at the .02 level of confidence).

f) The verbalized concepts were analyzed in terms of a negative and non-negative categorization. Negative concepts reflect unpleasant social situations, events, feelings, or social values. In the social concept test, for example, five items call for negative concepts, i.e., "breaking the law", "punishment", "conflict", "failure", and "deception". Other examples of negative concepts offered by the subjects are "possibility of death", "danger", "catastrophe", "tragedy", "a man has trouble with himself", "taking something you shouldn't take", "being scolded", and "cruelty". The remaining 16 items of the social concept test call for concepts which are clearly non-negative and range from strong positive to neutral in tone. Thus "help", "rescue", "selling", "instruction", "reassurance", "recreation", "greeting", "communication", "success", "leadership", "working on a job", "caring for", "working together", "courtesy", "service", and "honoring" would fall into the non-negative category. Other examples of non-negative concepts offered by the subjects were "protection", "people see it", "deal with children", "doing favors", "advice", "entertainment", "exercise", and so forth.

In comparing the relative incidence of negative responses for the two groups, it was decided to make separate comparisons for the 5 negative and 16 non-negative items. The reason for such a separation is that we would expect the controls, on an *a priori* basis, to have a greater number of non-negative responses on items designed to elicit non-negative responses and, conversely, a greater number of negative responses on items designed to elicit negative responses, so that a significant difference on one set of items in favor of one group might have been cancelled by a difference in favor of the other group had an overall comparison been made.

The procedure for making the comparisons was as follows: For each individual was computed the percentage of total number of verbal responses offered which were classified as negative. This was done separately for both the 16 non-negative items and the 5 negative items. The percentages of the schizophrenic group were dichotomized at the median point. The test of significance of the difference between the proportions of the two groups above and below the median point failed to reach the .05 level of confidence either on the non-negative or negative set of items (chi-square = 0.00, chi-square = 2.77, respectively).

It might be mentioned that a number of the schizophrenics' responses, highly individualistic

in content and involving projective components, are lost in or are not subtended by a straight negative or non-negative dichotomy. Such responses reveal features which either do not lend themselves to ready and objective characterizations, or if they do form a response type occur too infrequently among *different* individuals in the schizophrenic group to permit a statistically safe basis for generalization from this particular schizophrenic sample to a parent population. However, such responses have clinical significance because they occur only among the schizophrenics and do not occur among the controls, and because they demonstrate the effect of emotional factors upon cognitive processes. Responses having sexual content or connotations appear only among the patient's verbalizations. A striking example of this is the case of sorting together a card depicting a man helping a blind person with a cane in his hand across the street, together with a card depicting one skater helping to pick up another sprawled on the ice. The reason for this sorting was that "It's some kind of sex . . . cane makes me think of sex because it's long and you hold it. Isn't ice skates some kind of sex?" Another response was sorting together the following three cards: (a) two men at a bar—one saying, "My business has hit a new low!", the other responding, "Don't worry! It's bound to pick up in the next few months!" (b) an older may saying to a youth, "You shouldn't have lost your temper!" (c) a doctor holding forth a vial and saying to a patient, "I'm sure you'll feel better after taking this a few times!" The patient explained his grouping in the following manner. To the first card—"This is sex because they both have glass" (referring to the glass each man holds in his hand). When asked why the glass made him think of sex, the patient replied, "It eases us sometimes, eases your body." To the second card—"Maybe the man did something and the doctor gave him some tablets, maybe some kind of trouble with his wife and sister."

Also interesting are schizophrenic responses stressing the potentially dangerous or aggressive-defensive features of situations which are considered by the controls as neither danger-laden nor suggestive of interpersonal animosity. An example would be a sorting consisting of (a) two men watching a television screen showing the head and shoulders of a girl, (b) two men playing golf, (c) two men playing cards. The basis of this classification was that the situations were dangerous. The television scene was considered dangerous because "My mother never showed herself and I hope neither did yours." For the golf the reason was that "Someone might get hurt with the ball," while the card scene was explained as "Playing cards can always be quarrelsome, may lead to a quarrel." Or an innocuous (from the controls' standpoint) picture of two men playing chess may be grouped with pictures of a judge sentencing a person and a man punishing a dog because of a common element of anger, i.e., "This is chess; there's a chance of anger. Whenever there's people there's a chance of misunderstanding; one can say, 'I'm better than you; I can play better than you.' " Or (a) a man in an automobile waving a greeting at a passerby, (b) a young man and women horseback riding, and (c) two men playing dice, are all sorted together with this explanation—"This is danger because he's turning his head while driving; here (horseback picture) anything can happen, horse's eyes are not shielded and it can run away; (for the dice picture) it's prohibited to do that, that may hurt our children. I don't do that." Another example would be a grouping which comprises a young woman helping an older lady off a bus; a maid watching her mistress testing a spoonful of soup; a man offering a light to a young lady who is extending her cigarette. The response was, "These three could be danger." For the bus scene—"If she's not helped she'll fall down and hurt herself." For the soup scene—"If they don't eat, they'll starve." For the cigarette scene—"Here there's danger too. She would be very nervous if she doesn't smoke." Another example, less directly "dangerous" in tone, is sorting together a card portraying a lawyer, witness, and jury; one showing an army officer leading a charge; and one depicting a person leading a gymnasium group in knee-bends. The response was: (court)—"This lawyer is defending against persecution; (charge) these men are defending their country against the enemy; (gymnasium)—these men are doing exercises, learning how to defend

themselves." Another patient, after sorting cards depicting two men arguing, two children throwing snowballs at each other, and two farmers in a field, verbalized the concept as "fighting", explaining for the farm scene that "the farmer has a pitchfork and is about to start a fight." Occasionally one finds direct criticism on the part of the patient of the characters in the cards. Thus a scene of a bank robbery might be sorted with one showing a group of men watching a crane, with the explanation, "These went out for a stick-up (bank scene), and these (in the crane scene) instead of looking for work, just went around watching the steamshovel." A card showing a woman with a worried expression saying to another, "You're not looking at all well today", was commented on as follows: "Maybe she doesn't know what she's taking about! She (the woman not looking at all well) is feeling sore because the other woman doesn't know what she's taking about!" This observation served as a springboard for a subsequent flood of invective on the part of the patient against the competence of the medical profession.

Another type of response which appears only among the schizophrenics consists of intermingling the characters or situations of two or more cards. A simple example of this "combinatorial" type of response is placing together a card showing two women smiling over a baby carriage, and a card showing one woman saying to another, "Sure I'll lend you some sugar if you're all out of it." The reason offered is that "Maybe the child (in the carriage) needs sugar." Another example is juxtaposing the court scene mentioned above; the officer leading the charge; and a man leading a band, with the explanation—"He was a band leader in civilian; he received a card, a notice (court); and then he had to go into service (charge)." Or placing together a picture showing a man selling a medicine called "cure-all tonic" and a card depicting a group watching two wrecked automobiles. The response was, "Maybe the tonic didn't work and he had an accident; the idea is you shouldn't believe what they put out unless it's prescribed by a doctor."

Finally there is a certain peculiarity deviant basis of abstraction which occurs solely in the schizophrenic group; for example, sorting the card players, the golf players, and the television watchers because "Position is important"; the card players because "If a man wasn't sitting on the chair, he'd probably be playing cards on the floor"; the golf players because "A certain amount of experience is necessary, otherwise he wouldn't be in this position (the golfing position). If he didn't have the correct position, his partner or his friend may tell him so"; the television watchers because "Apparently these men like to drink soda and they're probably talking over the dates they're going to have." (Position?) It's accepted. "A man comes into a room, sees his friend sitting there and he does the same thing." Or sorting with the response "A hand is needed"; (a) the picture of two trapeze artists in mid-air; (b) a crowd applauding and waving to a man standing in an open automobile; (c) a scene depicting a man laying down a wreath on a memorial stone with others standing by respectfully. A hand is needed in the case of the trapeze artist because "The man has lost his grip." In the case of the man in the automobile, "a hand is needed. How else could you wave goodbye?" In the case of the memorial scene, "It's a grave-digging hand that's needed."

Discussion

Despite differences in approaches, some of the findings of this study are paralleled by the results of other investigators. For example, the greater uniqueness of the schizophrenics' sortings is analogous to the greater prevalence of original responses seen on the Rorschach test (9, 10) for this diagnostic group. Wegrocki (11) and Rashkis (7) have commented on the greater individuality of the schizophrenics' responses to generalization items, but they have not analyzed the phenomenon statistically.

The weaker tendency of the schizophrenics to sort "explicitly" may be viewed either as difficulties in effective communication according to the views of Cameron (3), or as an example of concretistic, i.e. "instance-bound", behavior according to the views of Goldstein and Scheerer (4).

The greater number of physicalistic responses among the schizophrenics represents a definite tendency for the schizophrenic group to shift from the personal-social element of the cards to a more neutral (but not necessarily less abstract) dimension. This result is strongly reminiscent of White's finding (12) that schizophrenics tend to give more impersonal sortings on a word arrangement problem than do normal controls, who sustain a more personal frame of reference. In this connection, Angyal's observation (1) that schizophrenics suffer from an inability to sustain disparate frames of reference, but slide from one to another indiscriminately, is also pertinent.

The category labeled "inappropriateness" denotes that even when schizophrenics are able to formulate a concept, they are more liable than normals to misapply such a concept in actual situations. Cameron (3) has pointed out that this tendency among schizophrenics leads to generalizations which are inapplicable from the standpoint of the concrete problem posed before the patient. Similarly Rashkis, Cushman, and Landis, as a result of their findings on a word-sorting test, state, "There is no doubt that schizophrenics do not deal with abstract concepts in their normal manner, but this does not necessarily mean that they do not have concepts of their own which serve as bases for behavior, even as the categorical attitude may guide the behavior of normals. The schizophrenic can think in an abstract way, but it is an eccentric or disorganized performance." (8, p. 73).

The failure to find significant differences between the two groupings in the number of negative and non-negative categorizations is interesting in that it denotes a certain amount of uniformity in emotional attitude toward the stimuli. This may be more a function of the stimuli rather than of the groups in so far as there is a relative lack of ambiguity in the various depicted situations with respect to categorizations based on feeling tone. Then too, aside from the structural features of the stimuli, there was no attempt made, in the construction of the social concept test, to inject deeply "dynamic" or emotionally charged situations such as appear, for example, on the Thematic Apperception Test. The problem may be worth investigating with less clearly structured and/or more emotionally laden situations, wherein projective components are permitted greater opportunity for response determination. However, this result does supplement White's (12) failure to find differences between her normals and schizophrenics in the number of words liked or disliked in a word arrangement problem. It might be pointed out that White's stimuli were also quite unamibiguous, consisting of separate, clearly legible, and meaningful words.

More generally, the findings lend support to a position such as Cameron's (3) which views the thinking of the schizophrenic as a manifestation of his social disarticulation. From this viewpoint one might expect that the schizophrenic would show a greater tendency than his matched control to emit more idiosyncratic responses, to fail to communicate his conceptions, or to communicate them inappropriately, and finally to withdraw from the situation entirely by rejecting the problem, or partially by avoiding its socially toned aspects.

Summary

The purpose of this study was to describe the qualitative differences in thinking between a group of 31 schizophrenics and 31 matched normal controls on a test of social concepts. The social concept test differentiated the two groups with respect to relative incidence of (a) individualistic responses, (b) rejections, (c) explicitly formulated concepts, (d) physicalistic responses, and (e) inappropriate responses. Significant differences were not observed between the two groups with respect to classification of responses along an emotionally negative and non-negative dimension, though individuals in the schizophrenic sample tended to manifest a greater frequency of responses that afford evidence of the intrusion of emotional factors. The results can be interpreted in terms of a position stressing the effects of the schizophrenic's social disarticulation upon his cognitive processes.

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PHENYLPYRUVIC OLIGOPHRENIA IN A MULATTO

Probable Manifestation of the Pleiotropic Effect

H. E. STADLER, M.D.,[1] HANS MEYER, M.D.,[2] AND HENRY LELAND, PH.D.[3]

There is growing interest in the constitutional-metabolic error which results in oligophrenia of the phenylpyruvic type. The fact that the mental retardation is related to the derangement in amino acid metabolism has yet to be proved, nevertheless the constant association of the two cannot be denied.

Jervis (4, 5), in discussing the pathogenesis of phenylketonuria, has offered two theories. The first theory holds that phenylalanine is not present at the time of critical need such as myelination. This would, according to this author, explain the defect in myelin formation observed at necropsy. The second theory holds that the high concentration of phenylalanine in the body fluids has a toxic effect on the developing nervous system and interferes with absorption or utilization of the other amino acids by nerve cells. It is now the consensus that the aberration in phenylalanine metabolism involves the inability of the organism to hydroxylate phenylalanine to tyrosine.

It would appear quite obvious that the *to be afflicted organism in utero* might escape the ravages of the metabolic error until birth (compensating or guarding effect of the normal maternal system during gestation). Once the infantile organism is thrown upon its own mechanisms, the defect in metabolism will have its effect on future myelination. The routine testing of the urine of newborn infants would serve to screen the population for phenylketonurics even though the incidence of the disease is admittedly low (5). Efficiency of the dietary control would lend itself greatly to early diagnosis.

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There are currently 27 instances of phenylpyruvic oligophrenia under observation at the Muscatatuck State School. These represent approximately 1 per cent of the population of the school. Our youngest phenylketonuric is 2½ years of age, and the oldest is 71 years of age.

Twenty-two of the 27 patients are blue-eyed, blond individuals, an incidence of 80 per cent.

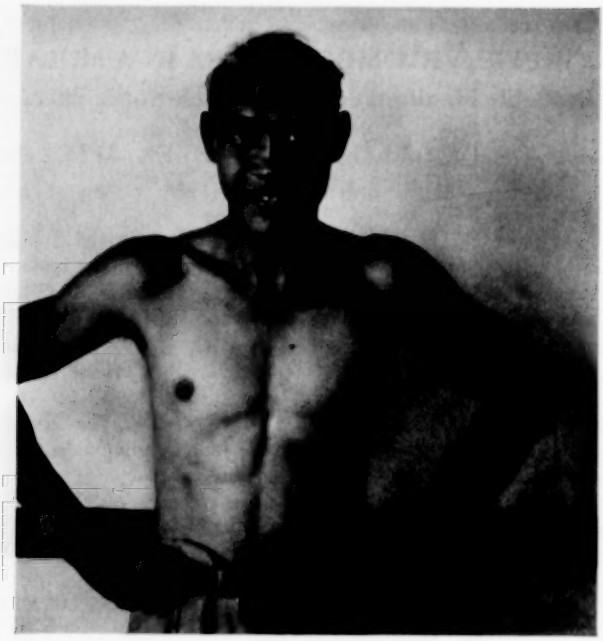
The coloring of the individuals did not appear to be of pre-eminent significance until we began our observation on R. A.

CASE HISTORY

R. A. was born on 3-3-30, and was said to have been a full-term infant, though actual birth weight was not known. The mother was a feeble-minded girl who was placed in a school for the mentally retarded shortly after the patient was born. Data concerning the father of the patient were not available to us.

The patient suffered from bronchitis as an infant, and night terrors were said to have occurred regularly. He was entered into kindergarten at the age of 5 years, but was unable to progress. He was first observed at the Muscatatuck State School on October 29, 1941, at which time he was 11½ years of age. His mental age was found to be 4 years and 9 months. He was observed again 2 years later with no change in his psychometric level. A positive urinary test for phenylpyruvic acid was obtained.

A recent examination of this patient (1-23-56) showed him to be a youthful mulatto who was 66½ inches tall and weighed 135 pounds. The hair was of coarse consistency, but sandy in color. The sclerotics were very blue. The O.F. head circumference was 20 inches. The fundi were typically negroid. The teeth were of the Hutchinsonian type. There was a rather coarse tremor of the fingers and the tongue. The general coordination was poor.



Color photograph of R. A. showing blond hair and striking blue eyes.

The gait was slow, and the Romberg test was negative.

Laboratory data

The hemoglobin was 13.8 grams per hundred cubic centimeters of blood; the RBC 5.35 million, and the WBC 6.35 thousand per cmm. of blood. The differential count was normal. A sickling preparation was negative. The blood and spinal fluid serology were negative. Serum protein concentration was 7 grams per hundred cubic centimeter. Phenylpyruvic acid tests performed on the urine were consistently positive.

Psychologic data

The Rorschach protocol indicates a very disturbed boy with a minimum of organic signs (5) and very distinct evidence of psychotic behavior as follows: low number of responses of which 30 per cent were poor quality W and 45 per cent were confabulatory, F minus per cent was high. Two pure color responses plus one add pure color response. There was only one popular response and 36 per cent very poor quality O's. All of this was accompanied by constant attempts at conversation, including such remarks as "I went to school, I did" or "These are pictures like they showed us in school". There was a constant attempt to impress the examiner with the high quality of his education which, when the Rorschach was finished, led to a long discussion with the patient in which he exposed a beautifully oriented fantasy about life at home and at school. All of this indicated a complete detachment from objective reality except that he had incorporated his job on the garden crew here in the institution into his fantasies so that casual conversation about the work which he does here gives the impression that he is in very good contact with reality.

The Goodenough given at the same time confirmed the loss of reality contact which is even more pronounced since the I.Q. is in the 40's, the higher I.Q. being earned because of the inclusion of certain items, thus making the absence of other items even more pronounced and lending greater credence to the schizoid pattern.

Bates (1) reported three patients all of fair

complexion including dermatographia and light sensitivity who suffered from phenylpyruvic oligophrenia. As has been stated before, the incidence of the blue-eyed, ash-blond type individual in our group of phenylketonurics was 80 per cent.

Note: We were able to find but one reported case of phenylpyruvic oligophrenia in the world literature involving a member of the colored race (2). It is unfortunate that the author did not describe the physical characteristics of his patient. Nordic constitutional qualities are hence not known. Fernandes (2) expressed the feeling that the "abnormal occurrence of excretion of phenylpyruvic acid is indicative of a broader incidence among other races."

Our case, R. A., strongly suggests the probable genetic linkage (pleiotropic effect) between albinism and phenylketonuria (3). The lack of other reported cases of phenylpyruvic oligophrenia in the "Negro" may well be dependent upon the need for existence of the genetic linkage with blondism. Further observations are necessary.

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SOCIETY PROCEEDINGS

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

Meeting of May 17, 1956

Dr. Wilfred Bloomberg, President, presiding

MONTH OF BIRTH AS RELATED TO PSYCHIATRIC CONDITIONS. HERBERT BARRY, JR., M.D.

Fourteen hundred mental hospital patients from New Jersey and Massachusetts had a seasonal distribution of birth differing markedly from that of the general population. The largest number of psychotics were born during the first four months of the year. The smallest number were born during May, June, July and August. The difference was 21 per cent. This finding is consistent with studies reported from Holland, Switzerland and Illinois. In sharp contrast with the distribution noted for psychotics, more births were recorded in the total population during the second trimester of the year than during the first.

A survey of the literature shows that season of birth is related to a variety of conditions. These include anencephaly, congenital cranial osteoporosis, and pentent ductus arteriosus. The last of these is readily explained by its epidemiology. It is a sequel of maternal rubella in early pregnancy. Since spring is the season for German measles, women who contract rubella at that time may give birth to defective babies later in the year. Neonatal deaths, on the other hand, have a seasonal distribution of birth which resembles more closely that for schizophrenia.

Season of birth has other interesting implications. There is a difference in the average levels of intelligence of persons born at different seasons. The difference is small but consistent. This fact is well established since it has been validated with more than 50,000 subjects. Geniuses, on the other hand, are born, paradoxically, more frequently when average IQ's are lowest. Illegitimacy and longevity also have a clear-cut seasonal birth distribution.

To attempt to explain these findings is beyond the scope of this report. Its purpose is to present evidence that seasonal differences in birth rates actually do exist and that they are especially striking in mental illness.

Discussion: DR. WILFRED BLOOMBERG: Are Dr. Barry's figures for seasonal distribution of birth based on the present population or is there any correction for age to give comparable figures at time of birth?

Moran, of the comedian team, Moran and Mack, said his father kept both white horses and black horses. He had to sell the white horses because they ate too much. The only reason for this was because he owned more white horses.

Could the seasonal distribution at birth be modified by seasonal differences in mortality? Might this continue to be a factor after the fourteen-day period of neonatal deaths, especially in relation to respiratory infections before the days of anti-biotics? The distribution shown for psychotics might be a result of some other factor which had modified the original distribution. The figures given might, therefore, represent differences in distribution of birth months of survivors. I wonder to what extent the psychotics are senile or arteriosclerotic, and the distribution figures reflect some association between season of birth and longevity, rather than reflecting such a relationship with non-organic psychoses.

DR. HUDSON HOAGLAND: Is it possible that dietary factors during pregnancy of the mother might play a possible role? Might not some change in a co-enzyme system occur on a seasonal basis thus accounting for both vulnerability to future psychosis as well as for the relation noted between season of birth and longevity?

DR. WILLIAM N. HUGHES: I am interested in the types of psychoses included. Are conditions which involve possible metabolic factors as well as manic depressive psychoses, psychoses due to infections and arteriosclerotic conditions all lumped together?

DR. ROBERT S. SCHWAB: Are there any figures for humans on differential rates of fertility from month to month? Are these differences uniform throughout the northern hemisphere?

DR. BLOOMBERG: Everybody seems to be trying to look for an explanation. Can this be on some basis other than a simple casual relation between season of birth and psychosis? Are there any other questions?

DR. PAUL I. YAKOVLEV: Is there an inversion in the southern hemisphere?

DR. BARRY: I am gratified that my facts were not challenged and that the discussion was centered about interpretations. Dr. Bloomberg's question, if I may paraphrase it, is whether many infants who might have become psychotics, had they survived, died instead because they were born during the summer. This might account for the smaller number of psychotics born at this season. If such be the case, these deaths must occur more than fourteen days after birth, probably because of gastro-intestinal disease. That is an interesting possibility. It should be explored.

In reply to Dr. Hughes, the series includes only cases in the age range from 16–40 at the time of first admission. It thus excludes senile psychoses as well as most mental illness due to toxic infections or degenerative conditions. A majority of the patients were diagnosed as schizophrenic and manic depressive. There were also a few cases of epilepsy, mental deficiency, etc. The other investigators cited limited their cases to schizophrenia except Peterson who also included manic depressives.

Since questions concerning methods of analyzing results have been raised, it should be noted that Wendell

Pile, on the basis of his data, denies that schizophrenia is related to month of birth. Yet the difference between the number of schizophrenics born in the "summer" and "winter" as calculated from his data is 16 per cent. He considers this difference negligible. Actually, the difference which he describes is in the same direction and of comparable magnitude with those of the other writers. His figures actually seem to confirm the findings of this study.

Dr. Hoagland's suggestion is most interesting. Sauvage de Nolting compares vitamin C levels in blood at different seasons in experimental subjects with his seasonal curve for birth months of schizophrenics. He found an almost perfect inverse relationship. Prior to World War I the diet contained more vegetables from April onward. The amount of sunshine at different seasons could also affect the total amount of vitamin D available.

In reply to Dr. Schwab's question, fertility undoubtedly has seasonal variations. Most writers have held that seasonal changes in birth rate are due to factors operating at the time of conception. Dr. McArthur has commented on the increased frequency of amenorrhea during the summer months. Consequently, the striking decline in birth rates during the hottest months in such areas as Sicily and southern Spain might be on the same basis.

Dr. Yakovlev's question can be answered with an unqualified "yes", from the data which is available, all of which shows an inversion in the southern hemisphere.

In closing, I should like to express my appreciation for the discussion. It seems clear that season of birth no longer belongs with the occult. Further investigation may open up a new approach to some predisposing factors in mental disease.

EXCRETION OF EPINEPHRINE AND NOREPINEPHRINE IN VARIOUS EMOTIONAL STATES. PART I—PHYSIOLOGIC ASPECTS, FRED ELMADJIAN, Ph.D.; PART II—PSYCHIATRIC ASPECTS, JUSTIN M. HOPE, M.D.

Normal and psychotic subjects were studied with respect to the emotional state and excretion of epinephrine and norepinephrine. After acid hydrolysis the urine was extracted with the alumina adsorption method of von Euler (*Acta physiol. scand. 22:* 161, 1951) and bioassayed by a modification of the method published by Gaddum and Lembeck (*Brit. J. Pharmacol. 4:* 401, 1949). A diurnal variation was observed in the excretion of the catechol amines with higher values occurring in the morning and the lowest during sleep. There is a greater variation in the excretion of epinephrine than norepinephrine with an average range of 1–4 mcg./24 hrs. for epinephrine and 30–60 mcg./24 hrs. for norepinephrine. Using excretion data obtained during infusion experiments, estimates of the secretion of epinephrine and norepinephrine is presented. Studies were done on 1) the players and coach of a professional hockey team, 2) neuropsychiatric patients appearing at staff conferences, 3) normal subjects in anticipatory states and 4) psychotic subjects receiving Lysergic Acid Diethylamide. The psychiatric data consisted of recorded longitudinal behavioral observations by trained psychiatric nurses and mental status examinations and psychiatric rating scale determinations by psychiatrists. Epinephrine and/or norepinephrine excretion was observed to be increased under these conditions. Data also includes the urinary excretion of catechol amines in psychotic subjects where psychiatric rating scales were obtained during the collection period. The results indicate that in general, the aggressive-hostile-active emotional display is related to norepinephrine excretion; while the self-effecting-fearful passive display is related to epinephrine excretion.

Discussion: DR. CHARLES A. KANE: Dr. Elmadjian has presented us with an apparent paradox. My inquiry is based on sincere interest and is not to be taken as criticism. On rapid arithmetic, from the ratio (milligram of norepinephrine/epinephrine) if one multiplies by 15–20 one arrives at figures considerably below figures reported by Goldenberg and others in patients with hypertension. These patients sometimes, but *not* always manifest anxiety. How do you explain this?

DR. WILLAIM N. HUGHES: This is an interesting paper which may soon be applied clinically. Patients who have normal EKGs may after three or four drinks have an auricular fibrillation. The same thing may happen after stress or exercise. The fibrillation may last for a short time and reappear. Have any studies been done on norephinephrine and epinephrine in such patients?

DR. HERBERT BARRY, JR.: About the Center in case #2. I was interested that he had a low norephinephrine-epinephrine to begin with, apparently did not play so well in that game. Does the N/E value before the game have a predictive value as to how an athlete will perform?

DR. ROBERT S. SCHWAB: Is there any relation between N/E and lactic acid in the blood?

DR. DANIEL H. FUNKENSTEIN: The experimentors are to be congratulated for their fine work. These experiments are most fascinating, ingenious, and well designed.

Although the methods we used in 1949 in showing this same relationship of anger to norepinephrine and anxiety and depression to epinephrine, were quite different, our results are similar.

Several papers will soon appear by other investigators confirming this same relationship and it now seems safe to state that Cannons "fight-flight" reaction can be divided into its component emotions with different physiological accompaniments.

Again, the experimentors are to be congratulated for their ingenious experiments, so carefully carried out and which contribute so much to our knowledge of the interrelationship of emotion, from the psychological standpoint as related to emotion from the biochemical standpoint.

DR. ELMADJIAN: In answer to Dr. Kane's comments—there is a marked discrepancy between values obtained by fluorimetry and bioassay techniques. The high values obtained with fluorimetry methods may be due to 1) the possibility that metabolic products of epinephrine are included in the titer in addition to epinephrine and 2) the reagents used in the method may have some fluorescence of their own. These aspects have been discussed by biochemists at several meetings. I would say that as of today I know of no really satis-

factory physical method for measuring epinephrine and norepinephrine in biologic fluids.

The bioassay method is not recommended for routine purposes. It is a research method. In addition to the extraction procedure there are two separate bioassay procedures to perform for estimation of epinephrine and norepinephrine. It is a rather exacting and tedious procedure.

It should be pointed out that in humans the measurable epinephrine in urine is in all probability of adrenal origin while the norepinephrine appears to be extra-adrenal in origin. We must be careful when comparing such urine excretion data with the data presented by Goodall for animals. The data in the latter case was concerned with concentrations of epinephrine and norepinephrine in adrenal medulla itself. For example the "aggressive" lion had 50 per cent epinephrine and 50 per cent norepinephrine while the "passive" rabbit has practically 100 per cent epinephrine in the medulla.

DR. HOPE: The second game in which the center did not play an exceptional game, his pre-game norepinephrine value was 0.7 mcg. and increased to 3.1 mcg. during the game. In the first game in which he played exceptionally well, his pre-game norepinephrine value was 3.9 mcg. while his post-game norepinephrine value was 16.1 mcg. which represents a greater than four-fold increase. In response to Dr. Barry's question regarding the prognostication of how an athlete will perform as determined by the norepinephrine pre-game value, we do not have enough data to answer this question. It certainly is a very practical question. Incidentally, the coach and the players want to know the answer, also. All we can say at the present time is that from our data in all instances, when the player's performance was exceptional, there was a sizable increase in norepinephrine excretion in the postgame specimen as compared to the pregame specimen.

DR. HUGHES: Have there been any experiments after alcohol?

DR. HOPE: We have not studied the alcoholics systematically. We have a few determinations on patients with delirium tremens. In these patients in whom there was a marked expression of fear and anxiety, the epinephrine was increased.

BOOK NOTES AND REVIEWS

Books received are acknowledged and given a brief description in this section. Selections serving a varitye of interests will be made from these for a more extensive review, as far as space will allow.

BOOK NOTES

Rolin, Jean: POLICE DRUGS (Translated from the French by Laurence J. Bendit.) [New York: Philosophical Library, Inc., 1956. Pp. 194, $4.75.]

The author of this little book became keenly interested in the famous Cens case which developed after a French policeman had been shot through the head by one of his colleagues during the German occupation. He survived and a complex psychological situation developed in which there were numerous tests, examinations, reversals of opinions and conflicting decisions.

The book by and large is a strongly expressed criticism of the drugs and methods used by the police to elicit confessions and other information. With this one case as a focus the author whose specialty is not obvious discusses the ethical, moral and spiritual aspects of various forms of drug administration.

The text contains a great deal of historical and legal material and other worthful information that make profitable reading. There is an appendix on "Narcoanalysis" by Edward V. Saher in which medico-legal problems are presented with a valuable bibliography of 96 items covering most of the pertinent literature on the subject.

Weihofen, Henry: THE URGE TO PUNISH. NEW APPROACHES TO THE PROBLEMS OF MENTAL IRRESPONSIBILITY FOR CRIME. [New York: Farrar, Straus & Cudahy, Inc., 1956. Pp. 213; $4.00.]

This book contains the fourth annual Isaac Ray lectures, delivered at Temple University, Philadelphia, in 1955. The author, professor of law at the University of New Mexico, discusses new approaches to the problem of responsibility for crime. He collected many facts to prove the need for a modernization and humanization of the criminal law. He makes a convincing and eloquent case against capital punishment. The jury system and increasing democratization have changed the harshness of laws. The sense of justice requires that the laws be changed. In most cases capital punishment and other severe punishments are not decreed. Consequently the harsh laws are used as a means of discrimination against certain types of offenders: the poor, those without any social or political influence; on the whole, men receive much more severe sentences than women. The author cites evidence to prove that capital punishment not only is not a deterrent to murder but, on the contrary, stimulates to murder. The famous M'Naghten rule and the difficulties of its application are clearly described and criticized, and suitable substitutes for the rule are presented. This relatively brief and well written book will be of great interest to forensic psychiatrists and lawyers because it deals with a great problem of forensic psychiatry in an authoritative way. Both the facts and the reasoning are pertinent and persuasive. The attempts at improvement are very much worth reading.

Spekter, L.: THE PEDIATRIC YEARS. [Springfield, Ill.: C. C Thomas, 1955. Pp. 734 with 21 figures $12.50.]

This is a unique text on pediatrics prepared by the Director of the Bureau of Maternal and Child Hygiene of the Connecticut Department of Health. It is emphasized in an introduction by Dr. Stanley Osborn that "It is not a textbook on medicine for physicians, or for nurses alone, but rather a reference book to aid all the workers allied to physicians in understanding quickly the problems affecting not only the sick or crippled child, but the well child". Therefore, social workers, teachers, physical therapists and occupational workers in hospitals who work with children will find it useful and informative. The worker, nontrained in medicine will find the extensive glossary of medical terms particularly helpful.

Children's diseases and peculiarities are described and discussed in a simple clear language which includes many rare as well as the common disorders, although the details of specific therapies have not been presented. However, the known preventive measures have been stressed and are given adequate attention. It is a most excellent book for the clinic and for the practitioner of pediatrics or child psychiatry.

Hal, V. E. (Editor): ANNUAL REVIEW OF PHYSIOLOGY, VOLUME 17. [Stanford, Cal., Annual Reviews, Inc., 1955. Pp. 551, $7.00.]

This volume, in a most important series covering a wide field of research, like its predecessors reveals a careful selection and a thoughtful emphasis of the areas where active interest and investigation have been outstanding during the period indicated.

The book begins with an interesting prefatory chapter of historical importance by Dr. F. C. Mann involving the development of his research program which finally came to such splended fruition at the Mayo Clinic. There are at least five sections comprising over a hundred pages which deal with researches on the nervous system functions. Other sections discuss the physiology of development, several endocrine and circulatory system functions and comparative physiology.

The present volume as well as the whole series serves the interests not only of physiologists but should be available to aid those workers in other sciences who desire to keep abreast of this subject at least to the extent of learning what has been accomplished, thought about, and what is currently under way.

Fishbein, Morris: MEDICAL PROGRESS: A REVIEW OF MEDICAL ADVANCES DURING 1954. New York: The Blakiston Division of McGraw-Hill Book Co., Inc., 1955. Pp. 346, $5.00.

This review of the advances in the medical sciences during 1954 is the third in the series of these useful books. There are 28 outstanding specialists in their respective fields who have contributed sections of the text. Each section gives an efficient review and orientation in its areas in which progress seems to have been made.

Psychiatry is presented by Dr. Francis J. Braceland who highlights neurophysiological and biochemical research, psychosomatic medicine, geriatrics, child psychiatry, alcoholism and the several new drugs that are being applied in the therapy of some of these disorders.

This book which, necessarily, is a somewhat condensed form of reporting covers the subjects well enough to be extremely useful for the busy physician who has a limited time or too little opportunity to spend in medical libraries reading original articles. Medical students should also find it valuable for orientation and advanced information in several specialities.

Martin, G. J.: ION EXCHANGE AND ADSORPTION AGENTS IN MEDICINE. THE CONCEPT OF INTESTINAL BIONOMICS. [Boston: Little, Brown & Co., 1955. Pp. 333, 49 tables and 24 figures, $7.50.

This comprehensive work is devoted to extensive researches into various aspects of ion exchange resins in their application to medical practice. This particular field of resins has grown rapidly during the last few years which makes the book a timely one and particularly authentic since the author has spent more than ten years in these investigations.

The introductory chapters present the general theory of ionization and the biochemical uses of ion exchange resins, but a large part of the text is devoted to clinical applications in gastric ulcer, toxic disorders of the gastro-intestinal system, and edematous conditions. In many respects the book is a modern version of Metchnikoff's autointoxication theories. The statement "It is my opinion as yet unsubstantiated by clinical observations, that all chronic degenerative disease has an important component in its etiology the absorption from the intestine of small quantities of toxic chemicals. These agents produce imperceptible but irreversible changes in tissues and in the course of years create gross pathology"; clearly outlines the author's objective in the continuation of his researches.

The book is well documented and indexed, the text is clearly presented and can be read with profit by all concerned with the biochemical and clinical problems of chronic disorders.

Snell, George D. (Editor): BIOLOGY OF THE LABORATORY MOUSE. [New York: Dover Publications, Inc., 1956. Pp. 498, and 172 figures, $6.00.]

This valuable book prepared by the staff of the Roscoe B. Jackson Memorial Laboratory is a new printing without alterations of the first edition which was published in 1941 by the Blakiston Company. In the Preface the editor says "Of all laboratory mammals, probably none has contributed more to the advancement of knowledge than the common mouse. Certainly among all the mammals it is most widely used for not less than one million mice are raised each year in this country for research in bacteriology, cancer and genetics".

It is, therefore, important that this text which has been out of print, should again be available and have its place along with similar books that have been written on other laboratory animals.

There are thirteen chapters of which four are devoted to embryology, reproduction and histoanatomy, six deal with the various aspects of genetics and tumor formation, two with diseases and the final one discusses care and recording. There are over 1,100 bibliographic references bearing on the wide field included.

This comprehensive book, the fruit of much thought and experience, constitutes a body of fundamental information that should be available on the shelves of every clinical or research laboratory where mice are used for diagnostic or research purposes.

BOOK REVIEWS

de River, J. Paul: THE SEXUAL CRIMINAL: A PSYCHOANALYTICAL STUDY. (2nd Edition) [Springfield, Ill., C. C Thomas, Publ., pp. xx + 375. $6.50.]

The second edition of this well illustrated book is larger than the first one. The main addition, part IV, consists of six chapters, written by M. E. Adams on the sex crimes committed in prison, by J. Call on the sex question from the judge's standpoint, by R. E. Blickon on the police officer's viewpoint, by E. D. Radin on a crime writer's reactions, by E. E. Cuff (an attorney) on the role of mental disease, and by J. P. de River on confessions and psychological investigations of sexual offenders. The number of case histories has been increased. Most of the offenders described are murderers. In all of the reported cases, violence (active or passive) was involved. The book deals with the statistically least frequent and most cruel perpetrators (male and female) of sex crimes. Each case study presents a very brief personal and family history, a summary of the somatic and "psychic" examinations, a transcript of an interview with the offender concerning his crime, and a short analysis and conclusion. The psychoanalytic explanation of the motivation is very brief and is not based on any intensive psychoanalytic study of the individuals, but consists almost exclusively of applying the concepts of the unsolved Oedipus or Electra complexes, of the sado-masochistic duality, and of bisexuality of homosexuality and compensations for them. These concepts are applied in a rather routine fashion. The author, a physician, is a founder and director of the Sex Offense Bureau of the City of Los Angeles. This book will be instructive to those who may not be fully aware of the diseased and cruel forms which the desire for sexual gratification can take. No one has a satisfactory explanation of lust murderers. The usual psychoanalytic explanation is insufficient because it applies equally well to millions of people who never kill for lust or for any other reason. Other factors, besides those usually advanced, are needed to complete the explanation. The cases have been well chosen but one should guard against easy generalizations. In the first place, these cases are not a random sample of all apprehended sexual offenders, and in the second place, most sex offenders and murderers are never apprehended. The fact that these men were apprehended requires as much explanation as their crime.

Z. A. PIOTROWSKI

Masserman, J. H.: THE PRACTICE OF DYNAMIC PSYCHIATRY. [Philadelphia: W. B. Saunders Co., 1955. Pp. 790, $12.00.]

This excellent textbook is built upon the author's theories of biodynamics which were

published in his previous book entitled "Principles of Dynamic Psychiatry" which appeared nine years ago and which aimed to integrate the physiology and psychology of behavior.

The present volume is an extension into clinical psychiatry and describes the history, types, methods and rationale of psychiatric therapy. The presentation is divided into five parts. Part one deals with goals and methods of psychiatric examination in great detail, with an account of the psychological tests, and other techniques of evaluating the intellectual and emotional status of the patient. Part two describes the various clinical syndromes of psychiatric disorders, illustrated by 155 case reports distributed through the text.

Part three is concerned with the administrative features and practical aspects of reporting as well as legal and other community aspects. Part four presents theoretical concepts of the dynamics of the self and the cosmos, and Part five which is the most extensive section deals with the history, the principles and the practice of therapy of different kinds.

It is a scholarly work the result of Dr. Masserman's wide experience in clinical practice, in teaching and in research. It covers a lot of ground evaluating many schools of thought as well as demonstrating Dr. Masserman's originality in several areas of the field. It can be read for pleasure and for profit, being worthy of the attention of all those interested in or concerned with psychological and psychiatric issues and problems. The bibliography is extensive and there is an index of names as well as of the subject matter. It will serve as a major contribution to psychiatry.

BOOKS RECEIVED FOR REVIEW

JULY, 1956

ABRAMSON, HAROLD A. (Editor) *Neuropharmacology*. Transactions of the Second Conference, May 25, 26, and 27, 1955. Josiah Macy, Jr. Foundation, New York, N. Y.

BARROW, ROSCOE L. AND FABING, HOWARD D. *Epilepsy and the Law*. Paul B. Hoeber, Inc., New York, N. Y.

BRILL, NORMAN Q. AND BEEBE, GILBERT W. *A Follow-up Study of War Neuroses*. Veterans Administration, Eastern Publications Depot, Washington, D. C.

DRAGSTEDT, CARL A. *Personal Health Record*. The Military Service Publishing Co., Harrisburg, Pa.

HOERR, NORMAND L. AND OSOL, ARTHUR (Editors). *Blakiston's New Gould Medical Dictionary*. Second Edition. Blakiston Division, McGraw-Hill Book Co., Inc., New York, N. Y.

LAUBENTHAL, F. *Leitfaden der Neurologie*. Georg Thieme Verlag, Stuttgart, Germany.

LIDDELL, HOWARD S. *Emotional Hazards in Animals and Man*. Charles C Thomas, Springfield, Ill.

MURPHY, LOIS B. AND ASSOCIATES. *Personality in Young Children*. Volumes I and II. Basic Books Inc., New York, N. Y.

RADERMECKER, J. *Systématique et Électroencéphalographie des Encéphalites et Encéphalopathies*. Masson & Cie, Editeurs, Paris, France.

STEINER, FRANZ. *Taboo*. Philosophical Library, Inc., New York, N. Y.

WALLIN, J. E. WALLACE. *The Odyssey of a Psychologist*. J. E. Wallace Wallin, Wilmington, Delaware.

NOTES AND NEWS

ORGANIZATION OF DAY HOSPITAL

The second day hospital to be organized by the New York State Department of Mental Hygiene will be opened at 105 Schermerhorn Street, Brooklyn, on October 8, Dr. Paul H. Hoch, Commissioner of Mental Hygiene, announced today.

The other center, at Hudson River State Hospital, began operation on July 2.

The day hospitals are a part of the Mental Hygiene Department's expanded experimental program and have been initiated on a pilot basis to determine the value of psychiatric and supportive therapy for suitable mental patients in a hospital setting during the daytime hours. Patients at the new centers receive psychiatric care on a voluntary outpatient basis during the day, returning to their homes in the afternoon and continuing existing family and community activities.

Patients will be referred only from the Brooklyn and Manhattan Aftercare Clinics, which receive from the state mental hospitals convalescent patients living in those areas. The addition of the day hospital service to existing facilities of the clinics is expected to reduce the number of patients requiring rehospitalization.

The Brooklyn day center will occupy the fourth and fifth floors at the Schermerhorn Street address where the Brooklyn aftercare clinic already is located. It will include a treatment wing with four semiprivate rooms accommodating eight beds each, examining and electric shock treatment rooms as well as three large areas for occupational therapy activities. Space also will be provided for offices, kitchen and dining room, reception rooms and lounges.

The day hospital has been designed for the care of 40 to 50 adults eighteen years or older and will operate five days a week from 9:30 a.m. to 4:30 p.m. The treatment program will consist of individual and group psychotherapy, social casework, drug and electric shock therapy, occupational and recreational therapy, and a sheltered workshop stressing development of job readiness.

A staff of fourteen will administer this center, headed by Dr. Donald M. Carmichael, director of aftercare clinics. Dr. Elizabeth Huff will be psychiatrist in charge. The staff will also include a psychiatrist, two nurses, a social worker, two occupational therapists, five psychiatric aides, and a stenographer.

NEW DIRECTOR OF BUREAU OF STATISTICS

The appointment of Robert E. Patton as director of the bureau of statistics of the Department of Mental Hygiene was announced by Dr. Paul H. Hoch, Commissioner of Mental Hygiene. Mr. Patton succeeds Benjamin Malzberg, Ph.D., who resigned to carry out a five-year research project on demographic and related aspects of mental disease.

An associate statistician in the bureau since January 1954, Mr. Patton entered state service in 1949 through the Civil Service College Series of Examinations. His first appointment was as a biostatistician in the State Department of Health, where he worked for five years. He acted as assistant director of that department's office of statistical services during 1953.

APPOINTMENT OF STATE SCHOOL DIRECTOR

Appointment of Dr. Frank R. Henne as director of Newark State School was announced by Dr. Paul H. Hoch, Commissioner of Mental Hygiene. Dr. Henne will take over the new post October 1. He succeeds Dr. Isaac N. Wolfson who was recently appointed senior director of Letchworth Village.

Dr. Henne has served for the past eight years as assistant director of Harlem Valley State Hospital at Wingdale, N. Y. He began his state service in 1936 as a medical intern at Marcy State Hospital, advancing to assistant physician in 1938 and senior assistant physician in 1941.

Dr. Henne is a graduate of the University of Toronto medical school, and served a two-year internship at Ottawa Civic Hospital, Ottawa, Canada, from 1926 to 1928 and a one-year

internship in the private medical service at Johns Hopkins Hospital, Baltimore, Md., in 1928–29. Prior to entering state service he was in general practice in Clayton, N. Y. from 1929 to 1936. During World War II he served on the staff of Billings General Hospital, Fort Benjamin Harrison, Indiana and with the 114th Staff Hospital in North Africa and Italy.

GROUP THERAPY INSTITUTE

The First Annual Training Institute of the American Group Psychotherapy Association will be held on January 9, 1957 at the Henry Hudson Hotel, New York City. On January 10, 11 and 12 the 14th Annual Conference will follow at the same location. For further information, please contact AGPA, Room 300, 345 E. 46 Street, New York City 17 by December 20th when advance registration will close.

NEW APPOINTMENT TO LETCHWORTH VILLAGE

Dr. Isaac N. Wolfson has been appointed senior director of Letchworth Village at Thiells, N. Y., by Dr. Paul H. Hoch, Commissioner of Mental Hygiene, it was announced today. Dr. Wolfson, director of Newark State School since 1950, will take over the new post September 1. He will succeed Dr. Harry C. Storrs, who retired June 30.

Dr. Wolfson has been in state service for 25 years. He graduated from Syracuse University College of Medicine in 1922 and after two years of general hospital work was engaged in the general practice of medicine for seven years in Syracuse, N. Y. He entered state service in 1931 at Hudson River State Hospital and became assistant director of Manhattan State Hospital in 1943. For the past six years he has served as director of Newark State School for the mentally retarded.

CONSULTANT SERVICE FOR THE AGED

Dr. Alvin I. Goldfarb of New York City has been appointed consultant on psychiatric services for the aged in the State Department of Mental Hygiene by Commissioner Paul H. Hoch.

The function of the new position, created by action of the 1956 Legislature, will be to coordinate geriatric problems and help in planning for the aged mentally ill.

Dr. Goldfarb from 1949 has been chief of the Department of Neurology and Psychiatry of the Hospital and Home for Aged and Infirm Hebrews in New York City. He is an assistant attending psychiatrist at Mt. Sinai Hospital, assistant psychiatrist at Presbyterian Hospital and an instructor of psychiatry at the Psychoanalytic Institute for Training and Research of Columbia University.

AMERICAN ACADEMY OF PSYCHOTHERAPISTS

The American Academy of Psychotherapists has been organized for the purpose of encouraging and providing opportunities for communication among professional workers in clinical and research areas of psychotherapy. The officers are Carl R. Rogers, Ph.D., President; Jerome M. Schneck, M.D., Vice-President; George Dolger, Ph.D., Secretary-Treasurer. Applications should be requested from Dr. Dolger, 11 Riverside Drive, New York 23, New York. He will supply information regarding standards for admission. The Academy held an Annual Conference at the New York Academy of Sciences on October 20, 1956.

APPOINTMENT IN PSYCHIATRIC RESEARCH

Dr. Ivan F. Bennett has been appointed chief of psychiatric research in the psychiatry and neurology service of Veterans Administration Central Office at Washington, D. C., VA announced.

He succeeds Dr. Richard L. Jenkins who has been reassigned as director of VA's psychiatric evaluation project (PEP), with headquarters in VA's Mt. Alto hospital in Washington.

Dr. Bennett comes to VA's Central Office in Washington from the VA hospital at Coatesville, Pa., where he was Executive Secretary of the hospital research committee, Asst. Chief, Acute Intensive Treatment Service and chief of the Physiologic Treatment Section.

FOURTEENTH ANNUAL MEETING OF AMERICAN PSYCHOSOMATIC SOCIETY

The American Psychosomatic Society will hold its Fourteenth Annual Meeting at Chal-

fonte-Haddon Hall in Atlantic City on Saturday and Sunday, May 4 and 5, 1957.

The Program Committee would like to receive titles and abstracts of papers for consideration for the program no later than December 1, 1956. The time allotted for presentation of each paper will be twenty minutes.

Abstracts, in sextuplicate, should be submitted for the Program Committee's consideration to the Chairman, at 551 Madison Avenue, New York 22, New York.

NEW OFFICERS FOR EEG SOCIETY

At the Tenth Annual Meeting of the American Electroencephalographic Society held in Atlantic City, June 15–17, 1956, the following were elected to office: *President*—Dr. John R. Knott, Psychopathic Hospital, Iowa City, Iowa. *President-elect*—Dr. Robert S. Dow, 1010 Medical Dental Building, Portland 5, Oregon. *Secretary*—Dr. J. K. Merlis, 150 S. Huntington Ave., Boston 30, Massachusetts. *Treasurer*—Dr. Peter Kellaway, Baylor University, Houston, Texas.

NORTH SHORE HEALTH RESORT LECTURE

The fourth lecture in the Seventh Annual North Shore Health Resort Lecture Series on "The Medical Practioner's Contributions Toward Healthy Emotional Development (The Physician as a Counselor)" will be held at the hospital, 225 Sheridan Road in Winnetka, Illinois on Wednesday, January 9, 1957 at 8:00 p.m *Problems of the School Child* will be discussed by RALPH D. RABINOVITCH, M.D. Director, Hawthorne Center, Consultant in Child Psychiatry, State Department of Mental Health, Northville, Michigan.